



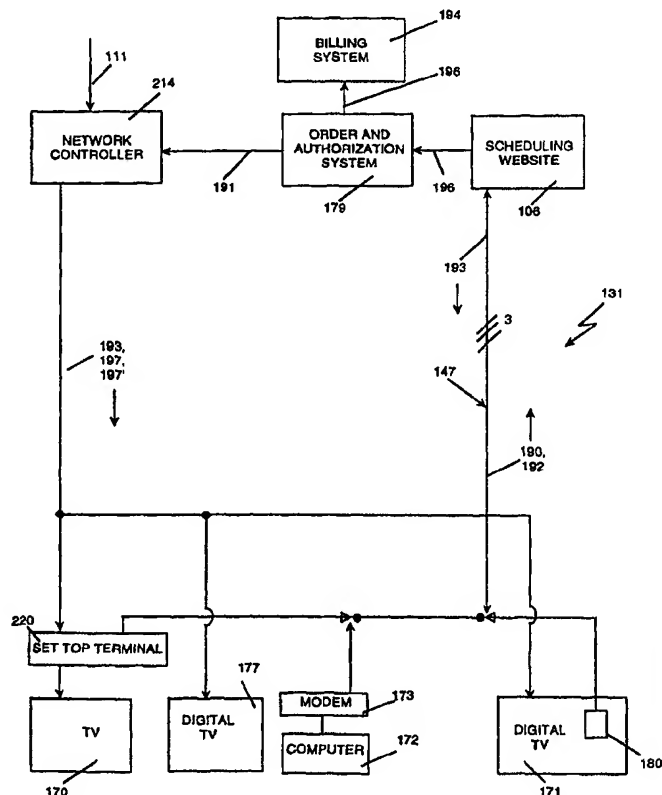
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>7</sup> : <b>H04N 7/16, 7/173</b>		<b>A1</b>	(11) International Publication Number: <b>WO 00/30354</b>
			(43) International Publication Date: 25 May 2000 (25.05.00)
(21) International Application Number: PCT/US99/26479 (22) International Filing Date: 10 November 1999 (10.11.99) (30) Priority Data: 09/191,520                      13 November 1998 (13.11.98)      US (71) Applicant: DISCOVERY COMMUNICATIONS, INC. [US/US]; 7700 Wisconsin Avenue, Bethesda, MD 20814-3522 (US). (72) Inventors: HENDRIKS, John, S.; 8723 Persimmon Tree Road, Potomac, MD 20854 (US). BONNER, Alfred, E.; 8300 Bradley Boulevard, Bethesda, MD 20817 (US). ASMUSSEN, Michael, L.; 2627 Meadow Hall Drive, Herndon, VA 20171 (US). McCOSKEY, John, S.; 4692 N. Lariat Drive, Castle Rock, CO 80104 (US). (74) Agents: HARROP, John, K. et al.; Dorsey & Whitney LLP, Suite 300 South, 1001 Pennsylvania Avenue N.W., Washington, DC 20004 (US).		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i>	

(54) Title: DIGITAL BROADCAST PROGRAM ORDERING

## (57) Abstract

A method and a system for selecting and ordering broadcast programs (197) uses an electronic program guide (310) that may be broadcast to subscribers or posted on an Internet web site (10). The system allows national broadcasters (110) to provide one or more channels of pay-per view or subscription programming and to establish a mechanism for billing subscribers who access the programs. Subscribers may access the Internet (105) and send a program request to the web site (106). An authorization (196) is then forwarded to a billing center (194) and to a local broadcaster (114). The billing center (194) debits the subscriber's account, or prepares a bill. The local broadcaster (114) sends the authorization to the subscriber. The authorization (196) includes a program code and a terminal identifier (197) that permits the subscriber's television (170) or set top terminal (220) to decrypt and display the program (197).



**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon			PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakhstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

**DIGITAL BROADCAST PROGRAM ORDERING**

1

2 Related Applications

3

4 This application is a continuation-in-part of application Serial Number  
5 08/711,742, filed September 10, 1996, entitled TELEVISION PROGRAM  
6 DELIVERY SYSTEM, which is a continuation of application Serial Number  
7 08/160,191, filed December 2, 1993, entitled TELEVISION PROGRAM DELIVERY  
8 SYSTEM, now U.S. Patent No. 5, 559,549.

8

9 This application is also a continuation of application Serial Number  
10 08/735,552, filed October 23, 1996, entitled NETWORK CONTROLLER FOR  
11 CABLE TELEVISION DELIVERY SYSTEMS, which is a continuation of  
12 application Serial Number 08/160,280, filed December 2, 1993, entitled NETWORK  
13 CONTROLLER FOR CABLE TELEVISION DELIVERY SYSTEMS, now U.S.  
14 Patent No. 5,600,364, which is a continuation-in-part of application Serial Number  
15 07/991,074 filed December 9, 1992 entitled TELEVISION PROGRAM  
16 PACKAGING AND DELIVERY SYSTEM WITH MENU DRIVEN SUBSCRIBER  
17 ACCESS.

17

18 This application is also a continuation of application Serial Number  
19 08/352,205 filed December 2, 1994, entitled NETWORK MANAGER FOR CABLE  
20 TELEVISION SYSTEM HEADENDS, which is a continuation-in-part of application  
21 Serial Number 07/991,074, filed December 9, 1992, entitled TELEVISION  
22 PROGRAM PACKAGING AND DELIVERY SYSTEM WITH MENU DRIVEN  
23 SUBSCRIBER ACCESS and application Serial Number 08/160,280, filed December  
24 2, 1993, entitled NETWORK CONTROLLER FOR CABLE TELEVISION  
25 DELIVERY SYSTEMS, now U.S. Patent No. 5,600,364.

26 The following patents and continuation-in-part applications, also based on the  
27 above-referenced patent application, are incorporated herein by reference:

28 U.S. Patent No. 5,798,785, entitled REPROGRAMMABLE TERMINAL  
29 FOR SUGGESTING PROGRAMS OFFERED ON A TELEVISION PROGRAM  
30 DELIVERY SYSTEM.

31 U.S. Patent No. 5,659,350, entitled AN OPERATIONS CENTER FOR A  
32 TELEVISION PROGRAM PACKAGING AND DELIVERY SYSTEM, dated  
August 19, 1997.

1 U.S. Patent No. 5,734,83, entitled SET-TOP TERMINAL FOR CABLE  
2 TELEVISION DELIVERY SYSTEMS, dated March 31, 1998.

3 Ser. No. 08/160,194, entitled ADVANCED SET-TOP TERMINAL FOR  
4 CABLE TELEVISION DELIVERY SYSTEMS, filed December 2, 1993.

5 U.S. Patent No. 5,682,195, entitled DIGITAL CABLE HEADEND FOR  
6 CABLE TELEVISION DELIVERY SYSTEM, dated October 28, 1997.

7 Background Of The Invention

8 The invention relates to television entertainment systems for providing  
9 television programming to consumer homes. More particularly, the invention relates  
10 to a method and an apparatus that allows subscribers to order broadcast digital  
11 television programming.

12 Advances in television entertainment have been primarily driven by  
13 breakthroughs in technology. In 1939, advances on Vladmir Zworykin's picture tube  
14 provided the stimulus for NBC to begin its first regular broadcasts. In 1975, advances  
15 in satellite technology provided consumers with increased programming to homes.

16 In addition to advances in television broadcast technology, government  
17 regulatory agencies have placed requirements on the broadcast television industry.  
18 In particular, the over-the-air broadcast television networks will soon transition to  
19 high definition television (HDTV) - a broadcast digital television standard. These  
20 broadcasters may elect to provide a single HDTV digital signal in their allotted  
21 bandwidth, with the remaining bandwidth used for standard definition television  
22 (SDTV) digital programming. While the broadcast networks may desire to structure  
23 some of these channels to include a subscription, or pay-per-view feature, no  
24 mechanism currently exists to allow the broadcast networks to control access to their  
25 future digital programming. Without an effective authorization and billing system,  
26 the broadcast networks will likely not implement pay-per-view programming, thereby  
27 reducing programming choices for consumers.

28 The broadcast networks may also provide the same broadcast programming  
29 over existing cable television and digital satellite television systems. As before, the



1 broadcast networks may want to control access to specific channels of their broadcast  
2 programming.

3 The present invention solves these problems so that over-the-air broadcast  
4 television services can be expanded to incorporate increased programming choices.

## 5 Summary Of Invention

6 This invention relates to a digital television program delivery system.  
7 Specifically, the present invention is a digital television program delivery apparatus  
8 and method that provides subscribers with access to multiple channels of digital  
9 television programming including pay-per view events. The invention incorporates  
10 advanced features such as menu-driven access and one-button program selection.

11 The invention makes use of developments in digital compression signaling  
12 that allows much greater throughput of television program signals over existing  
13 transmission media. These developments allow subscribers to use the invention to  
14 exploit a four-fold or more increase in current program delivery capability. In  
15 particular, the invention provides subscribers with a menu-driven access scheme to  
16 an expanded television program lineup, enabling subscribers to access and view  
17 selected programs using a user friendly interface.

18 This interface includes a remote control and a series of menus that may be  
19 sequenced by the subscriber using simple alpha, numeric and iconic character access  
20 keys, or by moving a cursor or highlight bar on the television screen. In this way, the  
21 subscriber can advance from one menu to the next with the press of a single button.  
22 Different television programs, grouped by category, for example, may be selected and  
23 accessed from each menu. The menus also allow for ordering subscriptions to  
24 speciality channels. Additionally, an interface is provided that allows for programs  
25 to be selected for viewing using the Internet. As a result, the invention provides  
26 subscribers with convenient methods of choosing a program for viewing from  
27 hundreds of program offerings.

28 The invention may be used in at least two domains: delivery of the broadcast  
29 digital multiplex signal via terrestrial, over-the-air media; and delivery of the  
30 broadcast digital multimedia signal over an existing cable television system. Over-

1 the-air delivery includes standard television broadcasts. Cable delivery systems  
2 include coaxial cable systems, fiber optic delivery systems, and telephone delivery  
3 systems (including T1 and T3 lines, Integrated Services Digital Network (ISDN) lines  
4 and Asymmetric Digital Subscriber Lines (ADSL)). In addition, programs may be  
5 provided by direct satellite broadcast, by wireless broadcasts, and by other wired  
6 means including local area networks.

7 To access the paid programming, an electronic program guide, program  
8 authorization system and billing system are used to provide a menu of available  
9 programming and to authorize receipt of programming and provide for payment by  
10 subscribers.

11 The electronic program guide may be provided as part of the broadcast from  
12 a national broadcaster. Alternately, the electronic program guide may be provided on  
13 an Internet web site. The electronic program guide may list discrete programs, series  
14 of programs, speciality channels, such as high definition television, and speciality  
15 programs, such as sports packages. A subscriber indicates a desired program to order  
16 by moving a cursor over the program, using a remote control, for example. The  
17 subscriber then operates a go button on the remote control to send an order signal to  
18 a remote location. Order signals may be sent to the national broadcaster, a broadcast  
19 affiliate, a local cable system, any other broadcast program provider, another remote  
20 location, and to the Internet web site.

21 In an embodiment, after receiving the order signal, an order and authorization  
22 system verifies that the subscriber is authorized to view the selected program, and  
23 sends an authorization signal to the broadcast program provider. The broadcast  
24 program provider then provides a local authorization code that is addressed to the  
25 terminal that originated the order signal. Alternately, the broadcast program provider  
26 may provide the local authorization to a terminal different from the terminal that  
27 initiated the program order. In this alternative, the address and identification number  
28 of the terminal to receive the program must be provided by the terminal initiating the  
29 program order. This alternative allows a subscriber to order a program from a  
30 location other than his home, such as at a kiosk in a video rental store. This  
31 alternative also allows the subscriber to provide access to a program, such as an

1 annual subscription to a speciality channel or a sports program package, to another  
2 subscriber, for example as a gift.

3 The local authorization code may be multiplexed with the digital programs  
4 being broadcast by the broadcast program provided. Alternately, the local  
5 authorization code may be supplied by a separate location such as the Internet web  
6 site.

7 These and other objects and advantages of the invention will become obvious  
8 to those skilled in the art upon review of the following description, the attached  
9 drawings and appended claims.

#### 10 Brief Description Of Drawings

11 Figure 1 is a diagram of a digital television broadcast environment.

12 Figure 2 is a diagram of the primary components of a cable television delivery  
13 system using the broadcast environment of Figure 1.

14 Figure 3 is a diagram of a terminal used in conjunction with the broadcast  
15 environment of Figure 1.

16 Figures 4a - 4c are diagrams of remote location reception options.

17 Figure 5 is a diagram of an operations center of the television delivery system  
18 of Figure 2.

19 Figures 6a-6c show embodiments of a local cable television delivery system.

20 Figure 7 shows a remote control for use in the broadcast environment of  
21 Figure 1.

22 Figure 8 is an example of an electronic program guide for use with the  
23 broadcast environment of Figure 1.

24 Figures 9a-9c are examples of order and authorizations systems for use in the  
25 broadcast environment of Figure 1.

26 Figure 10 is a diagram of a digital television broadcast environment.

27 Figure 11 is a diagram of an alternate digital television broadcast  
28 environment.

29 Figure 12 is a diagram of yet another example of a digital television  
30 broadcast environment.

1           Figure 13 is a diagram of an authorization signal for use with the broadcast  
2 environment of Figure 1.

3           Figure 14 is a diagram of a smart card.

4           Figures 15a-d show examples of an electronic program guide for use in the  
5 broadcast program environment of Figure 1.

6           Figure 16 is a flow chart showing the operation of the broadcast environment  
7 of Figure 11.

8           Figure 17 shows a menu structure for use with the television program delivery  
9 system of Figure 2.

10          Figure 18a is a drawing of storage for on-screen menu templates and other  
11 graphics files stored in graphics memory of the set top terminal.

12          Figure 18b is a drawing showing the hierarchical storage of text in memory  
13 for the set top terminal.

14          Figure 18c is a drawing of a flow chart showing the steps required for the  
15 microprocessor to retrieve, combine and display a menu.

16          Figure 19 is a block diagram of the hardware components of the set top  
17 terminal.

18          Figure 20a is a perspective front view of a set top terminal.

19          Figure 20b is a perspective rear view of a set top terminal.

20          Figure 21 is a schematic of a card upgrade for a set top terminal.

21          Figure 22a is a drawing of a frame format for a program control information  
22 signal.

23          Figure 22b is a drawing of a frame format for a polling response from the set  
24 top terminal.

## 25          Disclosure Of Invention

### 26           A.     Television Program Delivery System Description

#### 27               1.     Broadcast Television Environment

28           Figure 1 shows a broadcast television environment 100 in which a broadcast  
29 program provider, such as a national broadcaster 110, provides digital multiplex  
30 television programming 111 to a broadcast affiliate 112. The programming 111 may  
31 be provided to the broadcast affiliate 112 by any suitable means. For example, the

1 national broadcaster 110 may provide the programming 111 by satellite transmission  
2 using a satellite broadcast system 120. The satellite broadcast system 120 may include  
3 an uplink site 121, a satellite 122, and a downlink site 123. The satellite broadcast  
4 system 120 may transmit the programming 111 to the broadcast affiliate 112 and  
5 directly to terminals 140, 141 and 142 at remote locations such as subscribers'  
6 homes, for example.

7 The broadcast affiliate 112 may provide digital multiplex television  
8 programming 115 to intermediate locations such as local cable system 114 and an  
9 operations center 202. Alternately, the broadcast affiliates 112 may provide the  
10 programming 115 directly to the terminals 140-142. The operations center 202 may  
11 provide the programming 115 to the local cable system 114. The local cable system  
12 114 that receives the programming 115 may in turn provide the programming 115 to  
13 the terminals 140-142.

14 The terminals 140-142 may be any terminal capable of receiving digital  
15 television signals including digital televisions, digital set top boxes and personal  
16 computers, or any combination of these devices. The terminals 140-142 may receive  
17 the programming 115 by cable, including coaxial cable and fiber optic cable, by  
18 telephone cable (including T1 and T3 lines, Integrated Services Digital Network  
19 (ISDN) lines and Asymmetric Digital Subscriber Lines (ADSL)), and by satellite  
20 broadcast. Alternately, the terminals 140-142 may receive the programming 111  
21 directly from the national broadcaster 110 via the satellite broadcast system 120. For  
22 example, the terminal 142 receives direct broadcast satellite programming via a  
23 backyard antenna 143.

24 Also coupled to the terminals 140-142 may be an Internet 105. The Internet  
25 105 provides access to web sites such as web site 106. The web site 106 may supply  
26 online services and data that may be displayed on a television (not shown) or a  
27 personal computer (not shown), for example. The Internet 105 may also connect to  
28 the broadcast affiliate 112 and the national broadcaster 110. The national broadcaster  
29 110 may use the Internet 105 to post program menus and to provide a means for  
30 authorizing reception of pay-per-view broadcast programming and to receive payment

1 for the programming. The use of the Internet 105 for these purposes will be described  
2 later in more detail.

3 Figure 2 shows an expanded cable television program delivery system 200 that  
4 dramatically increases programming capacity using compressed transmission of  
5 television program signals and specifically incorporates the digital multiplex  
6 programming 111 from the national broadcasters 110.

7 In addition to the programming 111, subscribers are able to access an  
8 expanded television program package that includes other broadcast programming,  
9 video on demand, interactive services, including online services, data services and  
10 other programming. Subscribers view selected programs through a menu-driven  
11 access scheme that allows each subscriber to select individual programs by  
12 sequencing a series of menus. The menus may be sequenced by the subscriber using  
13 simple alpha-numeric and iconic character access or moving a cursor or highlight bar  
14 on the television display or the personal computer to access desired programs by  
15 simply pressing a single button, rather than recalling from memory and pressing the  
16 actual two or more digit numeric number assigned to a selection. Thus, with the press  
17 of a single button, the subscriber can advance from one menu to the next, or can select  
18 a program for viewing. In this fashion, the subscriber can sequence the menus and  
19 select a program from any given menu. The programs may be grouped by category  
20 so that similar program offerings are found on the same menu. Alternately, the  
21 programs may be arranged in the menu in a matrix fashion by channel and time/date  
22 of broadcast.

23 Subscribers are able to view the menu, or electronic program guide, of the  
24 programming 115 in a variety of formats. The electronic program guide may be  
25 broadcast by the national broadcaster 110 and displayed at the terminal 140.  
26 Alternately, the electronic program guide may be provided at the web site 106.

27 Figure 3 shows the terminal 140 in more detail. The terminal 140 includes a  
28 processor 161 that controls operation of components of the terminal 140. A display  
29 162 displays the programming provided by the national broadcaster 110. The display  
30 162 may be a CRT, a LCD, or any other device suitable for displaying digital  
31 television signals. A memory 163 stores programming instructions, terminal

1 operating instructions, authorization signals, programming, including targeted  
2 advertisements, programs watched data, and other information related to receiving  
3 and watching broadcast programs. A communications interface 164 provides  
4 communications with remote locations, such as the national broadcaster 110 and the  
5 Internet 105 shown in Figure 1. The communications interface 164 may be a cable  
6 modem, a telephone modem, a wireless modem, a fiber optic connector, a broadcast  
7 satellite receiver, a radio frequency receiver, a LAN connector, or any other device  
8 capable of one or two-way communication between the terminal 140 and the remote  
9 location, or any combination of these devices. A receiver module 165 receives  
10 broadcast programming from the national broadcaster 110. The receiver module 165  
11 may include one or more receivers. Alternatively, the functions of the receiver  
12 module 165 may be spread among other distributed equipment, such as a personal  
13 computer or smart card, for example. A tuner 166, coupled to the receiver module  
14 165, tunes to an appropriate channel to display a program provided by the national  
15 broadcaster 110. If the program is a pay-per-view program, it may be encrypted. A  
16 decrypter 167 decrypts such pay-per-view programs so that they may be displayed on  
17 the display 162. A command input device 168 sends commands to the processor 161.  
18 The command input device 168 may be a remote control or a data entry device  
19 included in the terminal 140. The command input device 168 may also be a remote  
20 device and a soft key board that is displayed on the display 162. A transmitter 169  
21 transmits information, such as program order signals, via the communication interface  
22 164 to the national broadcaster 110 or the Internet 105.

23 The terminal 140 also includes a demodulator 150, and a demultiplexer 159  
24 to process the programming 115, a NTSC encoder to convert digital signals to NTSC  
25 standard, and a video output to produce video for display on the display 162. Other  
26 components required to provide television programming at the terminal 140 are  
27 described later in more detail.

28 Some of the above features may be incorporated into the set top terminal 220,  
29 or may be added to the set top terminal 220 by use of a plug-in card, such that  
30 described in U.S. Patent 5,734,853, entitled SET TOP TERMINAL FOR CABLE  
31 TELEVISION DELIVERY SYSTEMS and in copending application Serial No.

1 08/160,194, entitled ADVANCED SET TOP TERMINAL FOR CABLE  
2 TELEVISION DELIVERY SYSTEMS, the disclosures of which are hereby  
3 incorporated by reference.

4 The terminal 140 may be embodied as a digital television with the above-  
5 described components built in. The terminal 140 may also be embodied as an analog  
6 or digital television with an attached set top terminal. The terminal 140 may further  
7 be embodied as a digital television that incorporates a smart card and that is coupled  
8 to a personal computer. Finally, the terminal 140 may be a digital television that  
9 incorporates a smart card alone. The terminal 140 may receive the programming  
10 over-the-air from the national broadcaster 110 or the broadcast affiliate 112, via a  
11 wired media such as by cable from the local cable system 114, and via the satellite  
12 broadcast system 120.

13 2. In-Home Reception Options

14 Figures 4a, 4b and 4c show reception options at the remote locations such as  
15 at a subscriber's home. In Figure 4a, a television 170 is coupled to a digital set top  
16 terminal 220. The set top terminal 220 receives the programming 115 from the  
17 broadcast affiliate 112 or the local cable system 114. The local cable system 114,  
18 using the cable headend 208 or the operations center 202 shown in Figure 2, may  
19 provide expanded television programming for display on the television 170.  
20 Alternately, the broadcast affiliate 112 may provide the programming 115 by use of  
21 the satellite broadcast system 120. In this alternative, the set top terminal 220 would  
22 be coupled to a local, or backyard, satellite dish antenna or similar device. In yet  
23 another alternative, the set top terminal 220 receives programming from both the  
24 satellite broadcast system 120 and the local cable system 114.

25 Also shown in Figure 4a is a telephone 178 that may be used to communicate  
26 with the broadcast affiliate 112 and the cable headend 208, and a personal computer  
27 172 and a modem 173 that may be used to communicate with the Internet 105. The  
28 personal computer 172 may be coupled to the set top terminal 220 via signal path 174.  
29 The signal path 174 may include a cable connection such as a RS-232 cable and  
30 connectors or by wireless means, such as infra red signaling and radio frequency  
31 signaling, for example.



1           The set top terminal 220 performs the necessary processing to send the  
2 programming 115 to the television 170 for display. For example, if the television 170  
3 is an analog television, the set top terminal 220 may demultiplex the programming  
4 115, convert the demultiplexed digital programming to a NTSC-compatible analog  
5 signal and provide the analog signal to the television 170. If the television 170 is a  
6 digital television, the set top terminal 220 may demultiplex the programming 115 and  
7 supply the demultiplexed signal to the television 170.

8           The set top terminal 220 may receive commands from a remote control 900.  
9 The remote control 900, which will be described in detail later, may be an infrared or  
10 a radio frequency control, or any other suitable control. The set top terminal 220 may  
11 include a variety of error detection, decryption, and coding techniques such as anti-  
12 taping encoding. The set top terminal 220 may include communication devices that  
13 allow reception and transfer of data with external sources such as the Internet 105.  
14 For example, the set top terminal 220 may include a telephone modem, a cable  
15 modem, a wireless modem, a fiber optic connector, a LAN connector, or any  
16 combination of these devices.

17           The set top terminal 220 has input and output ports for communication with  
18 other local and remote devices. For example, the set top terminal 220 may have an  
19 input port that receives information from the cable headend 208. The set top terminal  
20 220 may have output ports that provide communications from the set top terminal 220  
21 to the television 170 and to a video cassette recorder (VCR) 175. Certain menu  
22 selections may cause the set top terminal 220 to send control signals directly to the  
23 VCR 175 to automatically program or operate the VCR 175. Also, the set top  
24 terminal 220 may contain a phone jack that can be used for maintenance, trouble  
25 shooting, reprogramming and additional customer features. The phone jack may also  
26 be used to connect the set top terminal 220 with the Internet 105. The set top terminal  
27 220 may also contain stereo/audio output terminals and a satellite dish input port.

28           In an embodiment, the set top terminal 220 receives compressed program and  
29 control signals from the cable headend 208, the operations center 202, the broadcast  
30 affiliate 112, or the national broadcaster 110. After the set top terminal 220 receives  
31 the individually compressed program and control signals, the signals are

1 demultiplexed, decompressed, converted to analog signals (if necessary) and either  
2 placed in local storage (for later display of for other control functions, such as  
3 creating programming menus), executed immediately, or sent directly to the television  
4 screen.

5 After processing certain signals received from the cable headend 208, the set  
6 top terminal 220 is able to store menu data for generating menus that are displayed  
7 on a subscriber's television. Before a menu is generated, menu templates may be  
8 created and sent to the set top terminal 220 for storage. A microprocessor in the set  
9 top terminal 220 uses the control signals received from the operations center 202 or  
10 cable headend 208 to generate the menu templates for storage. Each menu template  
11 may be stored in volatile memory in the set top terminal 220. When the set top  
12 terminal 220 receives the menu template information, the set top terminal 220  
13 demultiplexes the program control signals received from the cable headend 208 into  
14 four primary parts: video, graphics, program logic and text. Each menu template  
15 represents a different portion of a whole menu, such as a menu background, a  
16 television logo, a cursor highlight overlay, one or more scalable display windows, or  
17 other miscellaneous components needed to build a menu. The menu templates may  
18 be deleted or altered using control signals received from the operations center 202,  
19 the cable headend 208, the broadcast affiliate 112 or the national broadcaster 110.

20 Once the menu templates have been stored in memory, the set top terminal  
21 220 can generate the appropriate menus. In an embodiment, the basic menu format  
22 information is stored in memory located within the set top terminal 220 so that the  
23 microprocessor may locally access the information from the set top terminal 220  
24 instead of from an incoming signal. The microprocessor next generates the  
25 appropriate menus from the menu templates and the other menu information stored  
26 in memory. The set top terminal 220 then displays specific menus on the subscriber's  
27 television that correspond to the inputs the subscriber selects. Alternately, menu  
28 viewing and program selection may use a web site on the Internet 105, which is  
29 accessed via the provided modem interface.

30 If the subscriber selects a specific program from the menu, the set top terminal  
31 220 determines on which channel the program is being shown, demultiplexes and

1 extracts the single channel transmitted from the cable headend 208. The set top  
2 terminal 220 then decompresses the channel and, if necessary, converts the program  
3 signal to an analog NTSC signal to enable the subscriber to view the selected  
4 program. The set top terminal 220 can be equipped to decompress more than one  
5 program signal. Two or more decompressors may be desirable to provide picture-on-  
6 picture capability, control signal decompression, enhanced channel switching or like  
7 features.

8 In addition to menu information, the set top terminal 220 may also store text  
9 transmitted from the remote location such as the cable headend 208 or the operations  
10 center 202. The text may inform the subscriber about upcoming events, billing and  
11 account status, new subscriptions, or other relevant information. The text may be  
12 stored in an appropriate memory location depending on the frequency and the  
13 duration of the use of the textual message.

14 Optional upgrades are available to enhance the performance of the set top  
15 terminal 220. These upgrades may include a cartridge or computer card (not shown)  
16 that is inserted into an expansion slot in the set top terminal 220 or may include a  
17 feature offered by the cable headend 208 or operations center 202 to which the user  
18 may subscribe. Available upgrades may include online data base services, interactive  
19 multi-media services, access to digital radio channels, and other services.

20 In an embodiment, available converter boxes such as those manufactured by  
21 General Instruments or Scientific Atlanta, may be modified and upgraded to perform  
22 the functions of the set top terminal 220.

23 Figure 4b shows an alternate arrangement of components for receiving the  
24 broadcast digital programming 115. In Figure 4b, the digital television 171 is coupled  
25 to the broadcast affiliate 112 to receive the programming 115. The digital television  
26 171 may also receive the programming 115, and other programming, from the local  
27 cable system 114 or from the satellite broadcast system 120.

28 The digital television 171 may include a smart card 180 that performs the  
29 functions described above for the set top terminal 220. For example, the smart card  
30 180 may include a cable modem, a telephone modem, a wireless modem, a fiber optic  
31 connector, or a LAN connector. The smart card 180 is described later in more detail.

1 Also shown in Figure 4b is the personal computer 172 and the modem 173, which  
2 function as before to connect to the Internet 105. The functions of the digital  
3 television 171 may be controlled by the remote control 900, using either infrared  
4 signals or radio frequency signals, for example.

5 Figure 4c shows another arrangement of components for receiving the  
6 broadcast digital programming 115. In Figure 4c, a digital television 171'  
7 incorporating the smart card 180 receives the programming 115 from the local cable  
8 system 114. The television 171' could also receive the programming via other media  
9 including direct satellite broadcast, fiber optic connections, local area network, such  
10 as an ethernet, the Plain Old Telephone Service (POTS), other telephone delivery  
11 systems (including T1 and T3 lines, Integrated Services Digital Network (ISDN) lines  
12 and Asymmetric Digital Subscriber Lines (ADSL)) and by over-the-air broadcast  
13 from the broadcast affiliate 112. The television 171', incorporating the smart card  
14 180, includes some or all of the functionality of the personal computer 172 shown in  
15 Figure 4b, for example. The television 171' connects to the Internet 105 and is able  
16 to access the web site 106 to view electronic program guides provided by the national  
17 broadcaster 110, the broadcast affiliate 112 or the local cable system 114. The  
18 television 171' is also able to access online services provided by the Internet 105, and  
19 to perform computing functions normally associated with the personal computer 172.  
20 The remote control 900 may be used to control the television 171'. The television  
21 171' may also, in its programming, include a soft key board 174 that is displayed on  
22 the display of the television 171'. The remote control 900 can then be used to operate  
23 "soft keys" on the soft key board 174. The television 171' may also incorporate a  
24 separate key board 174' that is used to control the television 171' and to operate the  
25 television 171' in its personal computer role. The key board 174' may be connected  
26 to the television 171' by a wired connection. Alternately, the key board 174' may  
27 communicate with the television 171' by wireless means including infra red signaling,  
28 radio frequency signaling and by other optical means including a laser. The television  
29 171' may connect to other devices and media including the VCR 175 or other audio  
30 or video recording device, and to a telephone system via signal path 154. The  
31 television 171' may then be used to display information related to incoming telephone

1 calls, such as a caller identification number, for example. The television 171' may  
2 also be used to support a video feed from a caller, such as in a video conference call.

### 3. Other System Components

4 Returning to Figure 2, the program delivery system 200 generally includes (i)  
5 at least one operations center 202, where program packaging and control information  
6 are created and then assembled in the form of digital data, (ii) a digital compression  
7 system, where the digital data is compressed, combined/multiplexed, encoded, and  
8 mapped into digital signals for satellite transmission to the cable headend 208 or the  
9 broadcast affiliate 112, and (iii) a set of in-home terminals. The program delivery  
10 system 200 transports the digital signals to the cable headend 208 where the signals  
11 are transmitted through a concatenated cable television system 210 or to the broadcast  
12 affiliate 112 where the programming 115 is sent to terminals, such as the terminal 141  
13 of Figure 1, that are adapted to receive these signals. Within the cable headend 208,  
14 the received signals may be decoded, demultiplexed, managed by a local central  
15 distribution and switching mechanism, combined and then transmitted to the set top  
16 terminal 220 located in each subscriber's home over the cable system 210. Although  
17 concatenated cable systems 210 are the most prevalent transmission media for  
18 connecting to the home, telephone lines (including T1 and T3 lines, Integrated  
19 Services Digital Network (ISDN) lines and Asymmetric Digital Subscriber Lines  
20 (ADSL)), cellular networks, fiber optics, local area networks, Personal  
21 Communication Networks, and analog and digital satellites and similar technology  
22 for transmitting to the home can be used interchangeably with the program delivery  
23 system 200.

24 In the discussion that follows, the functions of the set top terminal 220 are  
25 described. These same functions may also be carried out by the digital television 171  
26 with the smart card 180, shown in Figure 4b, for example.

27 The program delivery system 200 has a reception region 207 with an in-home  
28 decompression capability. This capability is performed by a decompressor housed  
29 within the set top terminal 220. The decompressor remains transparent from the  
30 subscriber's point of view and allows any of the compressed signals to be  
31 demultiplexed and individually extracted from the composite data stream and then

1 individually decompressed upon selection by the subscriber. The decompressed  
2 video signals may be converted into analog signals for television display. Such  
3 analog signals include NTSC and PAL formatted signals for use by a standard  
4 television. Control signals are likewise extracted and decompressed and then either  
5 executed immediately or placed in local storage such as a random access memory  
6 (RAM), a static random access memory (SRAM), a dynamic random access memory  
7 (DRAM), or other memory. Multiple sets of decompression hardware may be used  
8 to decompress video and control signals. The set top terminal 220 may then overlay  
9 or combine different signals to form the desired display on the subscriber's television.  
10 Graphics on video, picture-on-picture and split screen are examples of such a display.

11 Although a single digital compression standard (e.g., MPEG) may be used for  
12 both the program delivery system 200 and the concatenated cable system 210, the  
13 compression technique used may differ between the two systems. When the  
14 compression standards differ between the two media, the signals received by the cable  
15 headend 208 must be decompressed before transmission from the headend 208 to the  
16 set top terminals 220. Subsequently, the cable headend 208 must recompress and  
17 transmit the signals to the set top terminal 220, which would then decompress the  
18 signals using a specific decompression algorithm.

19 The video signals and program control signals received by the set top terminal  
20 220 correspond to specific television programs and menu data that each subscriber  
21 may access through a subscriber interface. The subscriber interface is a device with  
22 buttons, such as a key pad, located on the set top terminal 220 or the portable remote  
23 control 900. In an embodiment, the subscriber interface is the combined alpha-  
24 character, numeric and iconic remote control 900, which provides direct or menu-  
25 driven program access. The remote control 900 also contains cursor movement and  
26 go buttons as well as alpha, numeric and iconic buttons. The remote control 900,  
27 used in conjunction with the menu arrangement, enables the subscriber to sequence  
28 through menus by choosing from among several menu options that are displayed on  
29 the television screen. In addition, the subscriber may bypass several menu screens  
30 and immediately choose a program by selecting the appropriate alpha-character,  
31 numeric or iconic combinations on the subscriber interface. In an embodiment, the

1 set top terminal 220 generates the menus that are displayed on the television using the  
2 menu data and the menu templates, and the set top terminal 220 displays a specific  
3 menu or submenu option for each available video signal. In another embodiment, the  
4 menus are provided as a broadcast signal and are displayed on the television screen.  
5 In yet another embodiment, the menus are provided at a remote location, such as the  
6 web site 106 on the Internet 105, and subscribers may use the web site 106 for  
7 program selection.

8 4. Operations Center and Digital Compression System

9 The operations center 202 performs two primary services, packaging  
10 television programs and generating the program control information signal. At the  
11 operations center 202, television programs are received from external program  
12 sources in both analog and digital form. Figure 5 shows an embodiment of the  
13 operations center receiving signals from various external sources 212. Examples of  
14 the external program sources are sporting events, children's programs, specialty  
15 channels, news or any other program source that can provide audio or visual signals.  
16 Once the programs are received from the external program sources, the operations  
17 center 202 digitizes (and preferably compresses) any program signals received in  
18 analog form. The operations center 202 may also maintain an internal storage of  
19 programs. The internally stored programs may be in analog or digital form and stored  
20 on permanent or volatile memory sources, including magnetic tape or RAM or other  
21 suitable storage medium. Subsequent to receiving programming, the operations  
22 center 202 packages the programs into the groups and categories that provide the  
23 optimal marketing of the programs to subscribers. For example, the operations center  
24 202 may package the same programs into different categories and menus for weekday,  
25 prime-time viewing and Saturday afternoon viewing. Also, the operations center 202  
26 packages the television programs in a manner that enables both the various menus to  
27 easily represent the programs and the subscribers to easily access the programs  
28 through the menus.

29 The packaging of the digital signals may be performed at the operations center  
30 202 by computer assisted packaging equipment (CAP). The CAP system normally  
31 includes at least one computer monitor, keyboard, mouse, and standard video editing

1 equipment. A programmer packages the signals by entering certain information into  
2 the CAP. This information includes the date, time slot, and program category of the  
3 various programs. The programmer and the CAP may use demographic data and  
4 ratings in performing the packaging tasks. After the programmer selects the various  
5 programs from a pool of available programs and inputs the requisite information, the  
6 programmer, with assistance from the CAP, can select the price and allocate  
7 transponder space for the various programs. After the process is complete, the CAP  
8 displays draft menus or program schedules that correspond to the entries of the  
9 programmer. The CAP may also graphically display allocation of transponder space.  
10 The programmer may edit the menus and transponder allocation several times until  
11 satisfied with the programming schedule. During the editing, the programmer may  
12 direct the exact location of any program name on a menu with simple commands to  
13 the CAP.

14 The packaging process also accounts for any necessary groupings by satellite  
15 transponder. The operations center 202 may send different groups of programs to  
16 different cable headends 208 and/or set top terminals 220. One way the operations  
17 center 202 may accomplish this task is to send different program packages to each  
18 transponder. Each transponder, or set of transponders, then relays a specific program  
19 package to specific cable headends 208 and/or set top terminals 220. The allocation  
20 of transponder space is another important task performed by the operations center  
21 202.

22 The operations center 202 may also "insert" directions for filling local  
23 available program time in the packaged signal to enable local cable and television  
24 companies to fill the program time with local advertising and/or local programming.  
25 Consequently, the local cable headends 208 are not constrained to show only  
26 programs transmitted from the operations center 202. New set top terminals may  
27 incorporate both digital and analog channels. Therefore, the cable headend 208 may  
28 combine analog signals with the digital signals prior to transmitting the program  
29 signals to the set top terminals 220.

30 After packaging the programs, the CAP creates a program control information  
31 signal to be delivered with the program package. The program control information



1 signal contains a description of the contents of the program package, commands to  
2 be sent to the cable headend 208 and/or set top terminal 220, and other information  
3 relevant to the signal transmission.

4 In addition to packaging the program control information signal, the  
5 operations center 202 employs digital compression techniques to increase existing  
6 satellite transponder capacity by a 4:1 ratio, or more, resulting in at least a four-fold  
7 increase in program delivery capability. A number of digital compression algorithms  
8 currently exist which can achieve the resultant increase in capacity and improved  
9 signal quality desired for the system. The algorithms generally use one or more of  
10 three basic digital compression techniques: (1) within-frame (intraframe)  
11 compression, (2) frame-to-frame (interframe) compression, and (3) within carrier  
12 compression. For example, the MPEG 2 compression method may be used. After  
13 digital compression, the program signals are combined (multiplexed) and encoded.  
14 The combined program signal is subsequently transmitted to various uplink sites 204.

15 There may be a single uplink site 204 or multiple uplink sites (represented by  
16 204', shown in phantom in Figure 2) for each operation center 202. The uplink sites  
17 204 may either be located in the same geographical place or may be located remotely  
18 from the operations center 202. Once the combined program signal is transmitted to  
19 the uplink sites 204, the signal may be multiplexed with other signals, modulated,  
20 upconverted and amplified for transmission over satellite. Multiple cable headends  
21 208 may receive such transmissions.

22 In addition to multiple uplinks 204, the delivery system 200 may also contain  
23 multiple operations centers 202. One method for using multiple operations centers  
24 202 is to designate one of the operations centers 202 as a master operations center and  
25 to designate the remaining operations centers 202 as slave operations centers. In this  
26 configuration, the master operations center coordinates various functions among the  
27 slave operations centers such as synchronization of simultaneous transmissions and  
28 distributes the operations workload efficiently.

## 29 5. Cable Headend

30 After the operations center 202 has compressed and encoded the program  
31 signals and transmitted the combined program signals to the satellite, the cable

1 headend 208 receives and further processes the signals before they are relayed to each  
2 set top terminal 220. Each cable headend site is generally equipped with multiple  
3 satellite receiver dishes. Each dish is capable of handling multiple transponder  
4 signals from a single satellite and sometimes from multiple satellites.

5 As an intermediary between the set top terminals 220 and the operations  
6 center 202 (or other remote site), the cable headend 208 performs two primary  
7 functions. First, the cable headend 208 acts as a distribution center, or signal  
8 processor, by relaying the combined program signal to the set top terminal 220 in  
9 each subscriber's home. In addition, the cable headend 208 acts as a network  
10 controller 214 by receiving information from each set top terminal 220 and passing  
11 such information on to an information gathering site such as the operations center  
12 202.

13 Figure 6a shows an embodiment where the cable headend 208 and the  
14 subscriber's home are linked by certain communications media 216. In this particular  
15 embodiment, analog signals, digitally compressed signals, other digital signals and  
16 up-stream/interactivity signals are sent and received over the media 216. The cable  
17 headend 208 provides such signaling capabilities in its dual roles as a signal processor  
18 209 and a network controller 214.

19 As a signal processor 209, the cable headend 208 prepares the program signals  
20 that are received by the cable headend 208 for transmission to each set top terminal  
21 220. In an embodiment, the signal processor 209 re-routes or demultiplexes and  
22 recombines the signals and digital information received from the operations center  
23 202 and allocates different portions of the signal to different frequency ranges. Cable  
24 headends 208 which offer different subscribers different program offerings may  
25 allocate the program signals from the operations center 202 in various manners to  
26 accommodate different subscribers. The signal processor 209 may also incorporate  
27 local programming and/or local advertisements into the program signal and forward  
28 the revised program signal to the set top terminals 220. To accommodate this local  
29 programming availability, the signal processor 209 must combine the local signal in  
30 digital or analog form with the operations center program signals. If the local cable  
31 system uses a compression standard that is different than the one used by the

1 operations center 202, the signal processor 209 must also decompress and recompress  
2 incoming signals so they may be properly formatted for transmission to the set top  
3 terminals 220. This process becomes less important as standards develop (i.e., MPEG  
4 2). In addition, the signal processor 209 performs any necessary signal decryption  
5 and/or encryption.

6 As a network controller 214, the cable headend 208 performs the system  
7 control functions for the system. The primary function of the network controller 214  
8 is to manage the configuration of the set top terminals 220 and process signals  
9 received from the set top terminals 220. In an embodiment, the network controller  
10 214 monitors, among other things, automatic poll-back responses from the set top  
11 terminals 220 remotely located at each subscribers' home. The polling and automatic  
12 report-back cycle occurs frequently enough to allow the network controller 214 to  
13 maintain accurate account and billing information as well as monitor authorized  
14 channel access. In this embodiment, information to be sent to the network controller  
15 214 may be stored in RAM within each set top terminal 220 and will be retrieved only  
16 upon polling by the network controller 214. Retrieval may, for example, occur on a  
17 daily, weekly or monthly basis. The network controller 214 allows the television  
18 program delivery system 200 to maintain complete information on all programs  
19 watched using a particular set top terminal 220.

20 In addition to the above, the network controller 214 allows the television  
21 program delivery system 200 to receive detailed information regarding operations at  
22 each set top terminal 220. This information includes click-stream data such as  
23 operation of channel select buttons, cursor buttons, volume adjust buttons, mute  
24 buttons, and other buttons on the remote control 900, for example.

25 The network controller 214 is also able to respond to the immediate needs of  
26 a set top terminal 220 by modifying the program control information signal received  
27 from the operations center 202. Therefore, the network controller 214 enables the  
28 television program delivery system 200 to adapt to the specific requirements of  
29 individual set top terminals 220 when the requirements cannot be provided to the  
30 operations center 202 in advance. In other words, the network controller 214 is able  
31 to perform "on the fly programming" changes. With this capability, the network

1 controller 214 can handle sophisticated local programming needs such as, for  
2 example, interactive television services, split screen video, and selection of different  
3 foreign languages for the same video. In addition, the network controller 214 controls  
4 and monitors all compressors and decompressors in the system.

5 The television program delivery system 200 and digital compression provide  
6 a one-way path from the operations center 202 to the cable headend 208. Status and  
7 billing information may sent from the set top terminal 220 to the network controller  
8 214 at the cable headend 208 and not directly to the operations center 202. Thus,  
9 program monitoring and selection control may take place only at the cable headend  
10 208 by the local cable company and its decentralized network controllers 214 (i.e.,  
11 decentralized relative to the operations center 202, which is central to the television  
12 program delivery system 200). The local cable company will in turn be in  
13 communication with the operations center 202 or a regional control center (not  
14 shown) that accumulates return data from the set top terminal 220 for statistical or  
15 billing purposes. In alternative system embodiments, the operations center 202 and  
16 the statistical and billing sites are collocated. Further, telephone lines with modems  
17 may be used to transfer information from the set top terminal 220 to the statistical and  
18 billing sites. Alternately, the set top terminal 220 may incorporate a cable modem,  
19 a wireless modem, connectors, LAN connectors, T1 and T3 connectors, Asymmetric  
20 Digital Subscriber Line (ADSL) Connectors, Integrated Digital Service Network  
21 (ISDN) connectors or other advanced communications interfaces for transmitting  
22 information upstream to the cable headend 208, the operations center 202, a separate  
23 statistical and billing site, an Internet 105 web site, and other remote locations.

24 In the above discussion, the cable headend 208 was used to provide  
25 programming to the set top terminals 220. However, the national broadcaster 110  
26 could choose to send the programming 111 directly to the terminal 142 of Figure 1  
27 by satellite, for example. Optionally, the broadcast affiliate 112 could send the  
28 programming 115 directly to the terminal 140 or to the terminal 141.

29 Figure 6b shows the cable headend 208 having a file server 215 capable of  
30 storing digital compressed data. The cable headend components shown in Figure 2  
31 include the network controller 214, the file server 215, signal reception equipment

1       234, an authorization component 236, and a set of channel modulators 238. The  
2       network controller 214 performs many of its functions using its interface 232 with the  
3       file server and its interface 268 with the authorization component 236 (which, in turn,  
4       is connected to the file server 215 over a separate connection or interface 235). The  
5       network controller 214 and other cable headend components all work with one  
6       another to provide the capability to deliver programming in response to requests from  
7       subscribers. The signal reception equipment 234 receives RF signals 222 (which may  
8       include both analog or digital broadcast signals and digital programming and control  
9       information signals), ATM data 226, and local feeds 224. The signal reception  
10      equipment 234 may: (i) place various signals in storage in the file server 215 in  
11      digitally compressed format, (ii) send certain signals to the channel modulators 238  
12      for distribution over the cable distribution network 210' and/or (iii) send other signals  
13      to the network controller 214 for processing.

14             In the embodiment shown in Figure 6b, the signal reception equipment  
15      bypasses the file server 215, sending broadcast signals 239 over connection 240  
16      directly to channel modulator 238 for distribution to subscribers. The signal reception  
17      equipment 234 also transfers certain program control information and data to the  
18      network controller 214 over a control link or connection 242. In this way, the  
19      network controller 214 can receive the program control information signal from the  
20      operations center 202 or some other remote source through the signal reception  
21      equipment 234.

22             The authorization component 236 can receive requests for programs from the  
23      set top terminals 220 either by telephone line 244 or upstream data transmissions 246  
24      over the cable distribution network 210'. The authorization component 236 processes  
25      the subscriber requests, prompting the file server 215 to spool the program requested  
26      by the subscriber. Alternatively, the file server 215 may be instructed to transmit an  
27      authorization code to the subscriber to enable descrambling or reception of a specific  
28      program by the subscriber's set top terminal 220. The network controller 214  
29      monitors all incoming requests to the authorization component 236 in order to  
30      maintain up-to-date information on programs watched and viewing habits. By  
31      monitoring and coordinating with the authorization component 236 and the file server

1        215, the network controller 214 oversees, and in some cases initiates, the selection,  
2        spooling and transmission of programs, menus and advertisements to the subscribers  
3        in the cable distribution network 210'. The network controller 214 may also receive  
4        upstream data 246 directly.

5        Figure 6c shows a more detailed illustration of the cable headend 208  
6        components with a file server 215 and network controller 214. As shown in the  
7        figure, the headend includes signal reception equipment 234, an authorization  
8        component 236, a file server 215, MPEG decoders 250, a buffer with frame repeat  
9        252, channel modulators 238, and the network controller 214. The network controller  
10       214 includes several components. These components include a receiver 254 or set  
11       of receivers 254 (including a demodulator 254', demultiplexer 254" and/or buffering  
12       circuitry 255), a work station 256, a program control information (PCI) signal  
13       processing capability 258, a network management central processing unit (CPU) 260,  
14       databases 262, control software 264 and an instruction memory 266 (which stores  
15       computer program instructions that may be executed by the network management  
16       CPU 260). These components are exemplary of the components that reside within  
17       the network controller 214; however, other components, such as additional storage  
18       (e.g., RAM, ROM, EPROM, and EEPROM), processors, work stations, receiver  
19       equipment, signal processing devices, and additional software may also be included  
20       in the network controller 214.

21       The network controller 214 uses such components in its coordination and  
22       management of cable headend 208 operations. For example, the network  
23       management CPU 260 is linked or connected to all other components in the network  
24       controller 214. The network management CPU 260 also includes connections or  
25       links, either directly or indirectly, with other cable headend 208 components.

26       As shown in Figure 6c, the network management CPU 260 is linked to the  
27       authorization component 236 through a data and signal interface 268 (which may be  
28       the same or an interface separate from the interface 235 shown in Figure 6c that  
29       connects the authorization component 236 with the file server 215). The network  
30       management CPU 260 also coordinates and manages file server 215 functions  
31       through a separate interface 232. These interfaces between the network management

1 CPU 260, on the one hand, and the authorization component 236 and file server 215,  
2 on the other hand, may be direct or indirect through one or more interfaces. Such  
3 interfaces may be RS-232, RS-422, or IEEE-488 compatible. The network  
4 management CPU 260 also monitors and, in some instances, instructs the channel  
5 modulators 238 in regard to program distribution and signal processing activities over  
6 a separate connection or interface 269.

7 Within the network controller 214, the network management CPU 260  
8 includes a number of internal connections, links, or interfaces. Such links,  
9 connections or interfaces include direct or indirect full duplex data and signal paths,  
10 including a connection 270 to receiver 254, a connection 272 to work station 256, a  
11 connection 274 to the PCI signal processing equipment 258, a connection 276 with  
12 the data bases 262, a connection 278 with the instruction memory 266, a connection  
13 280 with the control software 264, as well as other connections to additional internal  
14 components as described herein. The network management CPU 260 uses these  
15 links, connections, and interfaces to exchange data and program signals with other  
16 network controller components and devices. Using such components and devices, the  
17 network controller 214 performs its cable headend 208 operations.

18 The receiver 254 or set of receivers 254 is equipped to receive upstream data  
19 transmissions 246 from the subscriber. This receiver 254 or receivers 254 may  
20 simply be a telephone modem or more sophisticated control receiver equipment that  
21 is adapted to receive upstream data transmissions 246 directly from the cable  
22 distribution network 210, 210' (Figures 2 and 6b). The network management CPU  
23 260 coordinates such reception by the receiver 254 or receivers 254.

24 The PCI signal processing equipment 258 is interfaced with the cable headend  
25 208 signal reception equipment 234. The PCI signal processing equipment 258  
26 enables the network controller 214 to receive the program control information signal  
27 from the operations center 202 or another remote site through an interface 242 with  
28 the signal reception equipment 234. The program control information signal is  
29 received by the network controller 214 and processed by the network management  
30 CPU 260 using the control software 264.

1           In some instances, the network management CPU 260 stores the data carried  
2           by the program control information signal. This data includes data on program  
3           packages and menu content and can be stored within the databases 262. The network  
4           controller 214 can modify the program control information signal and transmit the  
5           modified program control information signal to those set top terminals 220 in the  
6           cable distribution network 210' that require the use of such data in order to generate  
7           menus or perform other local processing capabilities.

8           The databases 262 include a variety of databases in which data from upstream  
9           transmissions 246 from the subscribers can be stored. The databases 262 may also  
10          store information and data on program packaging, menu content, advertisements and  
11          billing. No set number of databases 262 are required for the network controller 214  
12          to perform its operations, and a single temporary database may be used. In an  
13          embodiment, however, the network controller 214 uses several databases 262 that  
14          are accessed 278 during network management operations.

15          The network management CPU 260 also acts with the instruction memory 266  
16          as needed in order to run certain control and network management software 264.  
17          Such software may be stored in the instruction memory 266 or in one or more other  
18          storage locations within the network controller 214.

19          By maintaining links with the authorization component 236 and the file server  
20          215, the network controller 214 is flexible enough to maintain up-to-date programs  
21          watched information. Such programs watched information can be based on upstream  
22          data transmissions 246 that are received over the cable distribution network 210, 210'  
23          or through a telephone line 244. The network controller's 214 connection 232 with  
24          the file server 215 allows the network controller 214 to coordinate and manage  
25          intelligent selection and spooling of programs, menus and advertisements stored in  
26          the file server 215. Alternatively, the software resident within the network controller  
27          214 may reside within the file server 215 itself or certain functions may be split  
28          between the two cable headend components.

#### 29                   6.     Remote Control Device

30          The primary conduit for communication between the subscriber and the set  
31          top terminal 220 is through the subscriber interface, such as the remote control 900



1 shown in Figure 7. Through the remote control 900, the subscriber may select desired  
2 programming through the television program delivery system's menu-driven scheme  
3 or by directly accessing a specific channel by entering the actual channel number.  
4 Using the remote control 900, the subscriber can navigate through a series of  
5 informative program selection menus. By using menu-driven, iconic or alpha-  
6 character access, the subscriber can access desired programs by simply pressing a  
7 single button rather than recalling from memory and pressing the actual channel  
8 number to make a selection. The subscriber can access regular broadcast and basic  
9 cable television stations by using either the numeric keys on the remote control 900  
10 (pressing the corresponding channel number), or one of the menu icon selection  
11 options.

12 In addition to enabling the subscriber to easily interact with the television  
13 program delivery system 200, the physical characteristics of the subscriber interface  
14 900 also adds to the user friendliness of the system. The remote control 900 easily  
15 fits in the palm of the subscriber's hand. The buttons of the preferred remote control  
16 900 may contain pictorial symbols that are easily identifiable by the subscriber. Also,  
17 buttons that perform similar functions may be color coordinated and consist of  
18 distinguishing textures to increase the user friendliness of the system.

19 The remote control 900 may communicate with the set top terminal through  
20 wireless means such as infra red signals and radio frequency signals. In addition, the  
21 remote control 900 may communicate with the set top terminal by wired connections,  
22 and by other wireless means including laser-based optical signals that scatter the laser  
23 light at its source, microwave signals and masers. Laser links could be accompanied  
24 by a bidirectional radio frequency link to do automatic feedback control of the laser's  
25 pointing direction, with the laser slaved very tightly to the middle of the transmission  
26 beam width of the command interface in the set top terminal 220.

27 In the configurations shown in Figures 4a and 4b, the remote control 900 may  
28 be used to operate the set top terminal 220, the televisions 170 and 171 and the VCR  
29 175. The remote control 900 may also be used to operate the PC 172 of Figures 4a  
30 and 4b. If the remote control 900 is not used to operate the PC 172 of Figures 4a and

1 4b, the PC 172 may be operated by an attached keyboard (not shown) or some other  
2 suitable subscriber interface.

3 In addition to the remote control 900, the televisions 170, 171 and 177 of  
4 Figures 4a and 4b, the VCR 175 and the PC 172 may be operated by voice  
5 communications. For example, the PC 172 and the set top terminal 220 may be  
6 trained to recognize and respond to the voice of the subscriber.

7 B. Broadcast Program Ordering System

8 The selection of a program from the programming 115 or the programming  
9 111 begins with the subscriber viewing a menu of program choices. Figure 8 shows  
10 an example of an electronic program guide 300 that is related to the programming  
11 115. The program guide 300 could also be used to provide menu choice for  
12 programming provided directly by the national broadcaster 110 (i.e., programming  
13 111 shown in Figure 1). As will be described later, the program guide 300 may also  
14 be incorporated into a menu-driven program access system provided by the cable  
15 headend 208 or the operations center 202 of Figure 2. Alternately, the program guide  
16 300 may be sent to the set top terminal 220 over a dedicated channel, may be  
17 incorporated into other program signals, and may be provided at a remote location  
18 such as the web site 106 on the Internet 105.

19 Referring to Figure 8, the available programs are listed by title in a continuous  
20 time barker channel format. The program guide 300 lists the available programs in  
21 a matrix by time and channel. Thus, as shown in Figure 8, eight channels are  
22 available. Channel 1 is a free channel carrying HDTV programming. Channels 2  
23 through 6 are pay-per-view channels carrying other standard definition digital  
24 programming. Channels 7 and 8 are free channels and carry additional programming.

25 Each program in the program guide 300 could be identified by an event  
26 number that designates the time/date of broadcast, and by a program identifier, that  
27 uniquely identifies the program. The event data and the program identifier can be  
28 included in an authorization signal, or local authorization code, that is sent to the  
29 terminal 140. Alternately, the program identifier could be sent to the terminal 140,  
30 with an event number that allows the terminal 140 to access the selected program any

1 time it was broadcast. In this arrangement, the terminal 140 may be manually tuned  
2 to the channel carrying the selected program.

3 The number of channels carrying standard definition digital programming can  
4 vary, depending on the total bandwidth allocated to the national broadcaster 110. In  
5 addition, if HDTV programming is not provided, for example during off-peak hours  
6 from midnight to 6 a.m., additional channels may be available for SDTV digital  
7 programs. The program guide 300 will change to accommodate the number of digital  
8 channels available.

9 The program guide 300 may be used to directly order desired programming.  
10 The desired program may be selected by using cursor keys on the remote control 900  
11 to navigate the program guide 300 and to highlight programs listed in the program  
12 guide 300. When the desired program is highlighted, the go button of the remote  
13 control 300 may be operated to provide one-button ordering. That is, operation of the  
14 go button will send the order signal to the national broadcaster 110, for example.

15 The program guide 300 shown in Figure 8 includes a list of programs,  
16 available start times, costs to order and ratings. Other information may be included  
17 in the program guide 300. For example, for hit movies, the program guide 300 may  
18 include a brief description of the movie, its year of release, and the names of its major  
19 stars.

20 Other program guide configurations are also available. The program guide  
21 300 could be provided in a hard copy format. In this embodiment, the program guide  
22 300 could include alpha-numeric information that a subscriber would use to order a  
23 particular program. For example, a movie could be identified by an event number,  
24 that is the time and date of broadcast, and the duration of the broadcast, and by a  
25 program identifier that is unique to the movie. The event number and the program  
26 identifier could be included in the hard copy of the program guide 300. Other method  
27 for identifying a program or a series of programs are described in U.S. Patent  
28 5,659,350 entitled OPERATIONS CENTER FOR A TELEVISION PROGRAM  
29 PACKAGING AND DELIVERY SYSTEM, which is hereby incorporated by  
30 reference. To order a program, the subscriber could enter the event number and the  
31 program identifier into the terminal 140, using the remote control 900, for example.

1 By then pressing the go button on the remote control 900, the subscriber would be  
2 sending a program order. Alternately, the subscriber could call an order and  
3 authorization system and provide the event number and program identifier, or other  
4 descriptive information, over the telephone. The subscribers may also order a  
5 program by accessing an Internet web site, either from the set top terminal 220 or the  
6 PC 172 of Figure 4a, for example. The order and authorization system would then  
7 issue an authorization signal. A corresponding local authorization code may be  
8 provided with the programming 115 or via the Internet web site.

9 The program guide 300 may include submenus and other features, which will  
10 be described later with respect to the menu-driven access system.

11 For real-time ordering and authorization, when the desired program is  
12 highlighted, the subscriber orders the program by operating a go, or select, button, on  
13 the remote control 900. Operation of the go button begins the process of program  
14 reception, program authorization and program payment. Specifically, operation of the  
15 go button sends the order signal to a remote location. In response, an authorization  
16 signal may be provided by the remote location that received the order signal, or  
17 another remote location. The authorization signal includes the code required to  
18 decrypt and display the selected program on the television 171 of Figure 4b, for  
19 example.

20 Ordering and authorization may also be conducted in a non-real-time basis.  
21 For example, the local cable system 114 or the broadcast affiliate 112 may conduct  
22 periodic polling over the cable system or the plain old telephone system (POTS) to  
23 determine recent selections. Programs selected by the subscriber would then be  
24 registered with the local cable system 114 or the broadcast affiliate 112 and a bill  
25 would be prepared reflecting the cost to the subscriber for accessing these programs.  
26 Alternately, the set top terminal 220 or the television 171 may incorporate a smart  
27 card/cash card with a pre-paid limit, where a quantity of purchases are pre-authorized.  
28 In another alternative, the programs are paid for after the fact upon the cash card  
29 being returned to an authorization and billing facility or billing agent.

30 The program guide 300 may be used to display program suggestions for  
31 discrete programs and events. The program guide may also be used to display

1 multiple part programs, such as a television mini-series and subscriptions services.  
2 Subscription services could include speciality channels and speciality programs. The  
3 speciality channels could include a first-run movie channel, for example. The  
4 speciality programs could include sporting events, for example. A subscription to the  
5 sporting events could be on a favorite team basis, a full season basis, or a partial  
6 season basis, for example.

7 The program guide 300 of Figure 8 may be displayed for viewing by the  
8 subscriber in a variety of telecommunications media. For example, the program guide  
9 300 may be provided as an electronic program guide (EPG) and carried on a  
10 television channel. The program guide 300 would then be displayed on the television  
11 171. Alternately, the program guide 300 may be provided on a web site 106 of the  
12 Internet 105. In this alternative, the program guide 300 could be displayed on the  
13 personal computer 172 or the television 171 of Figure 4b. Additional details of the  
14 electronic program guide for use with the broadcast environment of Figure 1 are  
15 provided later.

16 The electronic program guide could also be provided as an individualized  
17 program guide that is tailored to a specific subscriber or group of subscribers. That  
18 is, the individualized program guide could present a menu of favorite programs,  
19 where the menu of favorite programs is developed based on information gathered  
20 about the specific subscriber. The information could include subscriber-entered data  
21 that is provided by the subscriber to a series of questions presented at the terminal  
22 140, for example. The series of questions may be presented when the specific  
23 subscriber initially accesses the broadcast environment, periodically thereafter, and  
24 at other times when desired by the specific subscriber. Gathering programs watched  
25 data is described in detail in copending application Serial No. 09/124,043 entitled  
26 METHOD AND APPARATUS FOR USING PROGRAMS WATCHED DATA,  
27 filed July 19, 1998, which is hereby incorporated by reference.

28 The programs watched data may be gathered by, or transferred to a processor  
29 in a remote location, such as the cable headend 208 and the broadcast affiliate 112,  
30 for example. The programs watched data may also be gathered by the set top terminal  
31 220 and then may be transferred to the processor in the remote location. The

1 processor may also receive the demographic data, and the other subscriber specific  
2 data.

3 Individualized menus may be provided by the cable headend 208 or the  
4 national affiliate 112, with the menu data included in the programming 115, for  
5 example. Alternately, the menu data may be provided by out of band signaling.

6 When the electronic program guide is provided on the Internet web site, the  
7 Internet web site may recognize the subscriber, based on the subscriber's automatic  
8 number identification (ANI), user name, user identification, and Internet address (i.e.,  
9 REMOTE\_HOST, REMOTE\_ADDR, and HTTP\_NAME), for example. The  
10 subscriber may also be identified by a unique subscriber identifier that is provided to  
11 the subscriber upon subscribing to a broadcast television service. Other means for  
12 identifying a subscriber include special features such as browser cookies. A browser  
13 cookie is a mechanism that allows a web site server to store limited amounts of  
14 information on a browser. The information is typically information sent to a  
15 subscriber's terminal using a Set-cookie HTTP response field header. The Set-cookie  
16 field contains the cookie content as a name/value pair, and can also contain  
17 information explaining when the cookie will no longer be valid (expires), the Internet  
18 domain for which the cookie is valid (domain), and the path portion of the URL  
19 within this domain for which the cookie is valid. Browsers that understand cookies  
20 will store the data on the terminal's hard disk, for example, and will return these data  
21 to the web site server from which the cookie originated within a cookie request header  
22 field. Cookies are useful for storing state information (when the subscriber last visited  
23 the web site, which resources the subscriber last used, for example) on the browser,  
24 in such a way that the information is not lost when the subscriber leaves the web site  
25 or shuts down the browser.

26 A web site, such as the web site 106, may use cookies to customize program  
27 ordering for a subscriber. For example, the web site 106 may welcome a subscriber  
28 to the web site 106, based on the information in the cookie, and may navigate the  
29 subscriber to a preferred menu, or individualized program guide, based on previous  
30 program orders provided by the subscriber.

1           When the subscriber is identified, the web site 106 may create the  
2 individualized program guide, which the specific subscriber may download to the  
3 terminal 140 (i.e., down load to the PC 172, the televisions 171 and 177 and the set  
4 top terminal 220).

5           Alternately, the subscriber may log on to the Internet web site, using the PC  
6 172 or the television 171' of Figures 4a-4c. The subscriber may then enter a  
7 subscriber identification. The Internet web site will then present the individualized  
8 menu to the subscriber, who may view the individualized menu on the television 171',  
9 for example. The individualized web site may be based on subscriber specific data,  
10 such as programs watched data, for example. The subscriber specific data may be  
11 stored in the set top terminal 220, for example, until a polling request message is sent  
12 to the set top terminal 220, for example.

13           In the situations described above, the specific subscriber may also view a  
14 generic program guide, such as the program guide 300, by use of the remote control  
15 900 or the PC 172 to enter a command to switch program guides. The specific  
16 subscriber may also view the individualized program guide, and select programs  
17 therefrom, by switching from the generic program guide to the individualized  
18 program guide.

19           The preceding discussion is based on the assumption that a subscriber initiates  
20 a program order from the subscriber's own terminal 140. However, the invention is  
21 not limited to this configuration. Alternately, the broadcast program provider may  
22 provide the local authorization code to a terminal different from the terminal that  
23 initiated the program order. In this alternative, an address and identification number  
24 of the terminal to receive the program, or some other means for identifying the  
25 terminal, such as the name and address of the individual to receive the program, must  
26 be provided by the terminal initiating the program order. This alternative allows the  
27 subscriber to order a program from a location other than his home, such as at a kiosk  
28 in a video rental store. This alternative also allows the subscriber to provide access  
29 to a program, such as an annual subscription to a speciality channel or a sports  
30 program package, to another subscriber, for example as a gift.

1           Figures 9a - 9c show alternate arrangements of an order and authorization  
2           system 179 that can be used with the programming 111 or 115. In the discussion that  
3           follows, the subscriber receives the programming 115 from the local cable system  
4           114. However, the order and authorization system 179 may also be used when the  
5           programming 115 is provided by the broadcast affiliate 112 or the satellite broadcast  
6           system 120, or any other entity capable of providing digital broadcast programs.

7           In Figures 9a - 9c, program order signals and program authorization signals  
8           may be provided over a variety of telecommunications media including via a cable  
9           modem to the local cable system 114; over a proprietary two-way transmission system  
10          to the local cable system 114; over a fiber optic cable system to the local cable system  
11          114, the broadcast affiliate 112 or the national broadcaster 110; via a telephone  
12          modem with any of the local cable system 114, the broadcast affiliate 112 and the  
13          national broadcaster 110, using existing telephone lines; via a cellular modem over  
14          wireless telecommunication systems; via T1 and T3 lines, Asymmetric Digital  
15          Subscriber Lines, Integrated Digital Services Network lines, and via a telephone and  
16          the plain old telephone system (POTS). Alternately, the broadcast programs and the  
17          order and authorization signals may also be provided over a LAN such as an ethernet.  
18          In addition either the order signals and the authorization signals may be provided over  
19          the satellite broadcast system 120. An alternate arrangement for one-way  
20          authorization control is to embed the authorization signal in the programming 115 or  
21          the programming 111.

22          In Figure 9a, the national broadcaster 110 provides the programming 111 to  
23          the broadcast affiliate 112. The broadcast affiliate 112 sends the programming 115  
24          to the local cable system 114. The local cable system 114 sends the programming 115  
25          to the terminal 140. To decrypt and display a program from the programming at the  
26          terminal 140, the subscriber must initiate the order signal. In the embodiment shown  
27          in Figure 9a, the subscriber sends an order signal 190 to the local cable system 114.  
28          Upon receipt of the order signal 190, the local cable system 114 sends an  
29          authorization signal 191 to the terminal 140. The authorization signal 191 includes  
30          a code that allows the terminal 140 to decrypt the program ordered with the order  
31          signal 190.



1           Figure 9b shows an alternate arrangement of the order and authorization  
2           system 179. The order and authorization system 179 shown in Figure 9b differs from  
3           that shown in Figure 9a in that an order signal 190' is sent to the broadcast affiliate  
4           112, and in return, an authorization signal 193 is returned to the terminal 140.

5           Figure 9c shows yet another arrangement of the order and authorization  
6           system 179. In Figure 9c, an order signal 190" is sent to the national broadcaster 110.  
7           The national broadcaster 110 then returns an authorization signal 195 to the terminal  
8           140.

9           The arrangements of the order and authorization system 179 of Figures 9a -  
10          9c show the authorization signal being sent by the same entity (e.g., the broadcast  
11          affiliate in Figure 9b) that received the order signal. The order and authorization  
12          system 179 is not limited to this configuration. For example, the order signal could  
13          be sent to the local cable system 114. The local cable system 114 could the relay the  
14          order signal to either the broadcast affiliate 112 or the national broadcaster 110. The  
15          broadcast affiliate 112 or the national broadcaster 110, respectively, could then send  
16          the authorization signal to the terminal 140. In yet another arrangement, the national  
17          broadcaster 110 or the broadcast affiliate 112 could relay the authorization signal to  
18          the local cable system 114. The local cable system 114 would then send the  
19          authorization signal to the terminal 140.

20          In another example, although Figure 9a shows the order signal 190 being  
21          transmitted to the local cable system 114, the order signal 190 could also be  
22          transmitted to another remote location maintained by the local cable system 114, or  
23          maintained on behalf of the local cable system 114. For example, the order signal 190  
24          could be transmitted to the web site 106 of the Internet 105. The local cable system  
25          114 could maintain the web site 106. Alternately, the national broadcaster 110, the  
26          broadcast affiliate 112, or some other entity, such as an online television guide  
27          service, could maintain the web site 106.

28          In yet another alternative, a first terminal 140 could access the program guide  
29          300 and transmit an order signal 190, but designate the ordered program for display  
30          on a second terminal 140. In this alternative, address and identification information  
31          for the second terminal 140 would be provided with the order signal 190.

1           In still another embodiment, the order and authorization system 179 may  
2           provide local authorization codes for two or more programs that air at the same time.  
3           In this alternative, the terminal 140 may display the programs in a split screen or  
4           picture-in-picture format, may cycle between the two or more programs, may delay  
5           display of a program until a later showing is provided, may save one or more  
6           programs in memory for later replay, may direct an attached VCR or other video  
7           recording device to record one program while another is displayed, may display a first  
8           program on a first television and a second program on a second television, or any  
9           combination of the above features. For example, a terminal 140 could be authorized  
10          to view a package of live football games airing simultaneously. The terminal 140  
11          could then cycle between games, or record one game and display a second game, for  
12          example. In order to accommodate these features, the terminal 140 may be provided  
13          with two or more tuners and associated processing components such as  
14          decompressors, demultiplexers and decrypters.

15          Figures 10, 11 and 12 show broadcast digital television environments that  
16          allow subscribers with different television reception capabilities to order and receive  
17          broadcast digital programming on a pay-per-view or subscription basis. Also shown  
18          in Figures 10-12 are terminals such as the terminal 140 of Figure 1. The terminals  
19          may have different capabilities. For example, one terminal could include an analog  
20          television 170 and a digital set top terminal 220 while another terminal 140 may  
21          include the digital television 171 equipped with the smart card 171.

22          In the discussion that follows, the terminal 140 is used to refer generically to  
23          the different combinations of components. In Figures 10, 11 and 12, the  
24          programming is shown being supplied by a local cable system. However, as  
25          discussed above, the programming, and associated ordering, authorization and billing  
26          signals could also be provided by other telecommunications media including by  
27          satellite broadcast, over-the-air broadcast, wireless broadcast, fiber optic broadcast,  
28          T1 and T3 lines, ADSL and ISDN lines, and broadcast over POTS, individually and  
29          in combination.

30          Figure 10 shows a broadcast digital television environment 121 in which the  
31          network controller 214 of a local cable system 114 provides digital broadcast

1 programming to subscribers. The network controller 214, as the controller of the  
2 local cable system 114, receives the programming 115 from the broadcast affiliate  
3 112, or directly from the national broadcaster 110. The network controller 214  
4 provides programming 197, which may include a local authorization code 197', to  
5 subscribers of the local cable system 114. The programming 197 may be multiplexed  
6 and compressed. The local authorization code 197', which may also be multiplexed  
7 and compressed, is provided in response to an order placed by the subscriber, and is  
8 formatted such that it can be interpreted only by the terminal to which it is addressed.  
9 That is, the local authorization code 197' includes an address corresponding to the  
10 terminal that ordered the program. The address may be built into the circuitry of the  
11 terminal 140, or may be provided by the local cable system 114, for example.

12 The network controller 214 also supplies a program guide signal 198, which  
13 includes data related to available programs. The program guide signal 198 may also  
14 include instructions for formatting the data, such as a menu template. The program  
15 guide signal 198 is interpreted by the terminal 140 receiving it and is used to produce  
16 the program guide 300 shown in Figure 8, for example. The program guide 300 may  
17 include additional submenus, such as notification submenus, escape submenus, and  
18 description submenus. The submenus are described in detail later.

19 Subscribers to the local cable system 114 may receive the programming 197  
20 and the program guide signal 198 in components that have different reception  
21 capabilities. In Figure 10, the set top terminal 220 receives the programming 197 and  
22 the program guide signal 198. The program guide signal 198 may be stored in a  
23 memory (not shown in Figure 10) of the set top terminal 220. Alternately, the  
24 program guide signal 198 may be provided on a real-time basis. Upon receiving a  
25 command to display the program guide 300, the set top terminal 220 formats the  
26 program guide signal 198 into a readable format such as that shown in Figure 8, and  
27 the television 170 displays the program guide 300. The set top terminal 220 may  
28 demultiplex, decompress, and decrypt the program guide signal 198. The television  
29 170 may be a digital television or an analog television. If an analog television, the set  
30 top terminal 220 converts the digital data to a NTSC-compatible analog signal for  
31 display.

1           The set top terminal 220 receives program selections from the subscriber (e.g.,  
2           by the subscriber operating the go button on the remote control 900). The set top  
3           terminal 220 then produces the order signal 190 to order the selected program. The  
4           order signal 190 may be provided over a cable television cable using a cable modem,  
5           a LAN, the POTS using a telephone modem, ADSL and ISDN, a fiber optic cable,  
6           and by wireless means using a wireless modem.

7           Also shown in Figure 10 is a digital television 171 that incorporates a smart  
8           card 180. The smart card 180 receives the program guide signal 198, and produces  
9           the program guide 300 for display on the television 171. The television 171 receives  
10          the programming 197 with the local authorization code 197', as appropriate. The  
11          smart card 180 receives program selections from the subscriber (e.g., by the  
12          subscriber operating the go button on the remote control 900). The smart card 180  
13          then produces the order signal 190 to order the selected program.

14          The order and authorization system 179, which may be located at the local  
15          cable system 114, a central billing location, or some other remote location including  
16          a web site on the Internet 105, receives the order signals 190 from the set top terminal  
17          220 and the smart card 180. The order and authorization system 179 then prepares  
18          the authorization signal 191 and sends the authorization signal 191 to the network  
19          controller 214. On receipt of the authorization signal 191, the network controller 214  
20          generates the local authorization code 197' that is addressed to the terminal from  
21          which the order signal originated, and multiplexes the local authorization code 197'  
22          into the programming 197.

23          The order and authorization system 179 also sends the authorization signal  
24          191 to a billing system 194. The billing system 194, on receipt of the authorization  
25          signal 191, prepares a billing record that may be sent to the subscriber on a periodic  
26          basis. The billing record may also be used to debit a subscriber's account with the  
27          local cable system 114, to debit a subscriber's checking account, or to charge to a  
28          subscriber's credit card, for example. If the program guide 300 incorporates an  
29          escape submenu (to be described later), the billing record may not be generated by the  
30          billing system 194 until a set time after the start of the program. This feature allows  
31          the subscriber to cancel viewing of a program without incurring a fee, provided that

1 a cancellation signal is received within the set time period, for example, five minutes.  
2 The subscriber can initiate the cancellation signal by accessing a hidden menu that  
3 incorporates this feature, for example. Alternately, the subscriber can cancel the order  
4 by manually tuning away from the channel displaying the selected program.

5 Figure 11 shows a broadcast digital television environment 131 in which the  
6 network controller 214 of the local cable system 114 provides digital broadcast  
7 programming to subscribers. The network controller 214, as the controller of the  
8 local cable system 114, receives the programming 115 from the broadcast affiliate  
9 112, or the programming 111 directly from the national broadcaster 110. The  
10 network controller 214 provides the programming 197, which may include the local  
11 authorization code 197', to subscribers of the local cable system 114. The local  
12 authorization code 197' is provided in response to an order placed by the subscriber,  
13 and is formatted such that it can be interpreted only by the terminal to which it is  
14 addressed. That is, the local authorization code 197' includes an address  
15 corresponding to the terminal that ordered the program. The address may be built into  
16 the circuitry of the terminal, or may be provided by the local cable system 114, for  
17 example.

18 The programming 197 may be received by subscribers having terminals with  
19 different reception capabilities. The set top terminal 220 receives the programming  
20 197 and may provide programs for display on the television 170. The television 170  
21 may be a digital or an analog television. If an analog television, the set top terminal  
22 220 converts the digital programs provided by the programming 197 into NTSC-  
23 compatible analog signals.

24 The digital television 177 also receives the programming 197. The digital  
25 television 177 displays those programs for which the local authorization code 197' is  
26 provided.

27 The digital television 171 equipped with the smart card 180 also receives the  
28 programming 197. The digital television 171 displays those programs for which the  
29 local authorization code 197' is provided.

30 As described above, the reception of the programming 197 is the same  
31 between the environment 121 shown in Figure 10 and the environment 131 shown in

1       Figure 11. However, the reception of the program guide data and program ordering  
2       differ. In the environment 131, the subscribers view the national broadcaster's  
3       program selections by accessing the web site 106 on the Internet 105. That is, the  
4       national broadcaster 110 may create the web site 106, and provide the web site 106  
5       with the program guide 300. The subscribers make program selections directly from  
6       the web site 106.

7               Referring to Figure 11, the set top terminal 220 is shown coupled to the web  
8       site 106 over the signal path 147. The signal path 147 may be a coaxial cable or a  
9       telephone line, for example. The set top terminal 220 may be coupled to the web site  
10      106 by a cable modem, a telephone modem, T1 and T3 lines, Integrated Services  
11      Digital Network (ISDN) lines and Asymmetric Digital Subscriber Lines (ADSL), a  
12      wireless modem or a fiber optic connector, for example. The display of the television  
13      170 may be used as the display for viewing the web site 106. The remote control 900  
14      may be used for sending commands to the set top terminal 220, which are then  
15      relayed to the web site 106 for selecting and ordering programs from the program  
16      guide 300. The web site 106 may also incorporate features such as a soft key board  
17      to increase its functionality.

18             Those skilled in the art will recognize many ways to access the web site 106.  
19      For example, the television 170 may display a web browser page that includes a  
20      location field. The web address may then be entered into the location field, using the  
21      remote control 900 or the key pad 221, and the go button of the remote control 900  
22      operated to complete the connection to the web site 106. Alternately, the national  
23      broadcaster 110 may provide an overlay or hidden menu (both of which will be  
24      described later) with a program that is currently being displayed on the television 170.  
25      The overlay menu or the hidden menu may contain a hypertext link to the web site  
26      106. The remote control 900 may then be used to select the hypertext link and the go  
27      button operated to activate the hypertext link to the web site 106. The hypertext link  
28      may also be provided at other web sites on the Internet 105. The national broadcaster  
29      110 may also provide a logo that overlays a broadcast program. In this case, the logo  
30      acts as a hypertext link. By selecting the logo, and operating the go button, the web  
31      site 106 may also be accessed.

1           In the above examples, the web site 106 may be displayed as a full screen  
2 display. Optionally, the web site 106 may be displayed in a separate window, or in  
3 a picture-in-picture format, so that the broadcast program continues to be displayed  
4 and seen on the television 170. The window containing the web site 106 display may  
5 be scaled or repositioned on the display of the television 170.

6           The web site 106 may include a single page listing the program choices in an  
7 electronic program guide, such as the program guide 300 shown in Figure 8.  
8 Alternately, the web site 106 may include multiple pages that are accessed through  
9 hypertext links or by operation of "forward", "back" and "home" buttons that are part  
10 of the web site 106 display. The additional pages may contain additional program  
11 choices, when, for example, the number of choices exceed that which can be  
12 conveniently displayed on one page. The web site 106 may also include additional  
13 pages that provide program description information, program reviews, information  
14 regarding performers, and other related information.

15           The web site 106 may be used to directly order programs. For example, the  
16 order signal 190 may be generated by selecting a program from the program guide  
17 300, and operating the go button of the remote control 900 to send the order signal  
18 190 to the web site 106.

19           The smart card 180 is similarly connected to the web site 106. The smart card  
20 180 may incorporate a cable modem, a telephone modem, a wireless modem or a fiber  
21 optic connector, for example.

22           The subscriber using the digital television 177 may use the personal computer  
23 172, which is coupled to the modem 173, to access the web site 106 and to view the  
24 program guide 300 and order programs for display on the digital television 177. The  
25 computer 172 may communicate with the television 177 by wired or wireless means.  
26 In Figure 12, the computer 172 is shown sending the local authorizations code 197'  
27 to the television 177 may be wireless. Wireless communication may be by infra red  
28 or radio frequency signaling, for example.

29           While the modem 173, the smart card 180, and the set top terminal 220 are all  
30 shown connecting to the web site 106 over the cable 147, the connection is not  
31 limited in this respect. The web site 106 may be accessed over a variety of different

1 telecommunications systems such as the POTS, a coaxial cable, a fiber optic cable,  
2 T1 and T3 lines, Integrated Services Digital Network (ISDN) lines and Asymmetric  
3 Digital Subscriber Lines (ADSL) or by wireless means.

4 The set top terminal 220, the smart card 180 and the modem 173 are all used  
5 to send the order signal 190 to the scheduling web site 106 and to view programs  
6 listed in the program guide 300. The order signal 190 indicates which program from  
7 the program guide is desired for viewing, and includes an address of the terminal  
8 requesting the program. When the scheduling web site 106 receives the order signal  
9 190, it sends an authorization request 196 to the order and authorization system 179.  
10 The authorization request 196 includes an identity of the desired program and the  
11 address of the terminal requesting the program.

12 The order and authorization system 179 prepares an authorization signal 191  
13 that is transmitted to the network controller 214. The network controller 214  
14 produces the local authorization code 197' and multiplexes the local authorization  
15 code 197' with the programming 197. The network controller 214 then broadcasts the  
16 programming 197 to the terminal connected to the local cable system 114. Only those  
17 terminals that receive an authorization code with a matching address are able to  
18 decrypt and display the programming.

19 The order and authorization system 179 also sends the authorization request  
20 196 to the billing system 194. The billing system 194 generates a billing record,  
21 which may be used to bill the subscribers for programs watched.

22 The order and authorization system 179 may include an escape feature for  
23 pay-per-view events. For example, if a subscriber decides, after ordering a program,  
24 not to watch the program, the subscriber may send a cancel program signal 192 to the  
25 web site 106. Software incorporated in the web site 106 or the order and  
26 authorization system 179 may include a time out feature. The time out feature allows  
27 the subscriber to view an ordered program for a short time, five minutes, for example,  
28 before the authorization request 196 is sent to the billing system 194.

29 If the subscriber sends the cancel program signal 192, the web site 106 or the  
30 order and authorization system 179 may generate a deauthorization signal 193. The  
31 deauthorization signal 193 is then sent to the terminal 140 that originated the cancel



1 program signal 192. The deauthorization signal 193 can be multiplexed into the  
2 programming 197, or may be sent over the cable 147.

3 Figure 12 shows a digital television environment 144 in which a national  
4 broadcaster 110, a broadcast affiliate 112, or a local cable system 114 provides digital  
5 broadcast programming to subscribers, but program authorization is handled over the  
6 Internet 105. That is, the local authorization code 197' is provided from the web site  
7 106 to the terminal 140. The local authorization code 197' is based on an address  
8 built into the set top terminal 220, for example.

9 The programming 197 may be received by subscribers having terminals with  
10 different reception capabilities. The set top terminal 220 receives the programming  
11 197 and may provide programs for display on the television 170. The television 170  
12 may be a digital or an analog television. If an analog television, the set top terminal  
13 220 converts the digital programs provided by the programming 197 into NTSC-  
14 compatible analog signals.

15 The digital television 177 also receives the programming 197. The digital  
16 television 177 displays those programs for which the local authorization code 197' is  
17 provided.

18 The digital television 171 equipped with the smart card 180 also receives the  
19 programming 197. The digital television 171 displays those programs for which the  
20 local authorization code 197' is provided.

21 In the environment 144 shown in Figure 12, the subscriber both orders the  
22 programming 197 and receives authorization to view the programming 197 by signals  
23 sent to, and received from the web site 106, respectively. The electronic program  
24 guide, such as the program guide 300 shown in Figure 8, is also provided at the web  
25 site 106. That is, in the environment 144, the subscribers view the national  
26 broadcaster's program selections by accessing the web site 106 on the Internet 105.  
27 The national broadcaster 110, the national affiliate 112, or the local cable system 114  
28 may create the web site 106, and provide the web site 106 with the program guide  
29 300. The subscribers then make program selections directly from the web site 106.

30 Referring to Figure 12, the set top terminal 220 is shown coupled to the web  
31 site 106. The set top terminal 220 may be coupled by a cable modem, a telephone

1 modem, a wireless modem, T1 and T3 lines, Integrated Services Digital Network  
2 (ISDN) lines and Asymmetric Digital Subscriber Lines (ADSL), for example. The  
3 display of the television 170 may be used as the display for viewing the web site 106.  
4 The remote control 900 may be used for sending commands to the set top terminal  
5 220, which are then relayed to the web site 106 for selecting and ordering programs  
6 from the program guide 300. The web site 106 may also incorporate features such as  
7 a soft key board to increase its functionality.

8 The smart card 180 is similarly connected to the web site 106. The smart card  
9 180 may incorporate a cable modem, a telephone modem, a wireless modem or a fiber  
10 optic connector, for example.

11 The subscriber using the digital television 177 uses the personal computer  
12 172, which is coupled to the modem 173 to access the web site 106 and to view the  
13 program guide 300 and to order programs for display on the digital television 177.

14 While the modem 173, the smart card 180, and the set top terminal 220 are all  
15 shown connecting to the web site 106 over the cable 147, the connection is not  
16 limited in this respect. The web site 106 may be accessed over a variety of different  
17 telecommunications systems such as the POTS, T1 and T3 lines, Integrated Services  
18 Digital Network (ISDN) lines and Asymmetric Digital Subscriber Lines (ADSL) a  
19 coaxial cable, a fiber optic cable, or by wireless means.

20 The set top terminal 220, the smart card 180 and the modem 173 are all used  
21 to send order signals 190 to the scheduling web site 106 to view programs listed in  
22 the program guide 300. The order signal 190 indicates which program from the  
23 program guide 300 is desired for viewing, and includes an address of the terminal  
24 requesting the program. When the scheduling web site 106 receives the order signal  
25 190, it sends an authorization request 196 to the order and authorization system 179.  
26 The authorization request 196 includes an identity of the desired program and the  
27 address of the terminal requesting the program.

28 The order and authorization system 179 prepares an authorization  
29 confirmation signal 196' that is transmitted to the subscriber's terminal, such as the  
30 set top terminal 220. The national broadcaster 110, for example, broadcasts the  
31 programming 197 to the subscriber's terminals 140, such as the set top terminal 220.

1 Only those subscriber's terminals 140 that receive the authorization confirmation  
2 signal 196' with a matching address are able to decrypt and display the programming.

3 The order and authorization system 179 also sends the authorization request  
4 196 to the billing system 194. The billing system 194 generates a billing record,  
5 which is used to bill the subscribers for programs watched.

6 The cable 147 may also be used for other communications with the web site  
7 106. For example, if a subscriber decides, after ordering a program, not to watch the  
8 program, the subscriber may send a cancel program signal 192 to the web site 106.  
9 Software incorporated in the web site 106 or the order and authorization system 179  
10 may include a time out feature. The time out feature allows the subscriber to view an  
11 ordered program for a short time, five minutes, for example, before the authorization  
12 request 196 is sent to the billing system 194.

13 If the subscriber does not send the cancel program signal 192, the web site 106  
14 or the order and authorization system 179 may generate a deauthorization signal 193.  
15 The deauthorization signal 193 is then sent via the cable 147 to the terminal 140 that  
16 originated the cancel program signal 192.

17 The cable 147 may also be used to complete the program billing process. The  
18 billing system may send a debit signal (not shown) over the cable 147 to the terminal  
19 140. The received debit signal debits a cash card (not shown) contained in the  
20 terminal 140. The cash card could be part of the smart card 180. The cash card may  
21 be removable or fixed to the smart card 180. Increases in value of the smart card 180  
22 may also be accommodated over the cable 147. For example, the order and  
23 authorization system 179 may send a credit signal (not shown) to the terminal 140,  
24 after the order and authorization system 179 receives a payment or electronic funds  
25 transfer from a subscriber.

26 The order and authorization system 179, or other remote location may send  
27 messages to terminals in the broadcast television environment 144. For example, the  
28 order and authorization system may send promotional messages to the terminal 140.  
29 The promotional messages may advertise upcoming programs or suggest purchase of  
30 special features such as a speciality sports program. The order and authorization  
31 system may send targeted advertisements to the terminal 140, where the targeted

1 advertisements are selected based on a subscriber profile maintained in the local cable  
2 system 114, for example. Targeted advertising is described in detail in copending  
3 applications Serial No. 08/735,549, entitled NETWORK CONTROLLER FOR  
4 CABLE TELEVISION DELIVERY SYSTEMS and in Serial No. 09/054,419,  
5 entitled TARGETED ADVERTISEMENT USING TELEVISION DELIVERY  
6 SYSTEMS, the disclosures of which are hereby incorporated by reference.

7 The terminals 140 may use the broadcast environment 144 for other  
8 communications purposes. For example, the terminals 140 shown in Figure 12 may  
9 send electronic mail to each other via the Internet 105, may access other web sites on  
10 the Internet 105 and may participate in multimedia conference calls, for example.

11 In an embodiment, program access information, in the form of the local  
12 authorization code 197' is provided to the terminal 140 from the national broadcaster  
13 110, for example. Figure 13 shows the details of the local authorization code 197'.  
14 The local authorization code 197' may be a frame format signal. The local  
15 authorization code 197' may include a leading flag 401 at the beginning of the signal,  
16 an address field 403, a terminal identifier 405, an information field 407 and a trailing  
17 flag 411 at the end of the signal.

18 The eight-bit flag 401 that appears at the beginning of the frame and the eight-  
19 bit flag 411 that appears at the end of the frame are used to establish and maintain  
20 synchronization. The eight-bit flag may be a "01111110" bit-stream. The address  
21 field 403 designates a 4-bit address for a given terminal 140. The address field 403  
22 may also include one or more routing indicators (not shown). The routing indicators  
23 may be used in the case where a signal, such as the local authorization code 197' must  
24 pass through several nodes of a telecommunications network. The terminal identifier  
25 405 is a 16-bit field that uniquely identifies each terminal 140 with a 15-bit  
26 designation followed by an appended P/F bit 413. Although field size is provided by  
27 this example, a variety of sizes can be used with the present invention.

28 The information field 407 is variable in length. The variable length feature  
29 allows the local authorization code 197' to include a number of program  
30 authorizations, as shown in Figure 13. The information field 407 includes an eight-bit  
31 field 407' that contains an event number and a sixteen-bit field 407" that contains a

1 program identification. The event number 407' may be formatted so that each time  
2 a particular program airs, the terminal 140 will be able to access the program. That  
3 is, the subscriber will only have to pay once to view the program for an indefinite  
4 number of showings in the future. The number of showings could be limited to those  
5 showing that occur in the current month, for example. The terminal 140 is able to  
6 access any program identified in the information field 407. Other methods for  
7 identifying programs are described in U.S. Patent 5,659,350, entitled OPERATIONS  
8 CENTER FOR A TELEVISION PROGRAM PACKAGING AND DELIVERY  
9 SYSTEM, which is hereby incorporated by reference.

10 The P/F bit 413 may be used to command a polling response from the terminal  
11 140 addressed, as described below. The P/F bit may be used to command the  
12 terminal 140 to provide a response back to the national broadcaster 110, for example.  
13 Such a response could command the terminal to report programs watched  
14 information, for example, that is stored in a memory of the terminal 140. The  
15 programs watched information could be used by the billing system 194 of Figures 10-  
16 12 to generate the billing record. The programs watched information could also be  
17 used for other purposes such as targeted advertising. Collection of such programs  
18 watched data is described in U.S. Patent 5,600,364, entitled NETWORK  
19 CONTROLLER FOR CABLE TELEVISION DELIVERY SYSTEMS, and in  
20 copending application Serial No. 09/124,043, entitled METHOD AND APPARATUS  
21 FOR GATHERING PROGRAMS WATCHED DATA, the disclosures of which is  
22 hereby incorporated by reference.

23 In an embodiment, the local authorization code 197' is received by the  
24 terminal 140 shown in Figure 3 and may be stored in the memory 163. When a  
25 subscriber tunes the terminal 140 to a broadcast digital channel, the processor 161  
26 will then compare the local authorization code 197' to the programming 197 to  
27 determine if the subscriber is authorized to view the selected program. If  
28 authorization is granted, the processor 161 then directs the decrypter 167 to decrypts  
29 the selected program and displays the decrypted program on the display 162 of the  
30 terminal 140.

1           In another embodiment, the processor 161 will instruct the tuner 166 to tune  
2     to the channel carrying the authorized program at some time prior to the start of the  
3     authorized program. For example, the tuner 166 may tune to the channel carrying the  
4     authorized program one minute prior to the start of the program. The processor 161  
5     may be programmed by the subscriber to execute commands upon the occurrence of  
6     certain events. For example, the processor 161 may be programmed to instruct an  
7     attached recording device to record a program using a "tape program" command. If  
8     the subscriber has chosen "tape program," the processor 161 will begin recording the  
9     program on the attached VCR or other recording device at the start of the authorized  
10    program. If the display 162 of the terminal 140 is off, and the subscriber has chosen  
11    "turn on television," the processor 161 will turn on the display 162. If the subscriber  
12    has not chosen "turn on television," and the television is off, but the "tape program"  
13    command is pending, the processor 161 will instruct the VCR, or other recording  
14    device, to begin recording the program at the start of the selected program. The  
15    processor 161 may also be programmed to pause, or stop, recording, during  
16    commercial breaks, if any, in the programming 197. Recording of the program ends  
17    when the program is complete. The processor 161 may then return the tuner 166 to  
18    the channel previously selected, if a free channel, tune to the next authorized program,  
19    or tune to a menu channel that provides the program guide 300.

20           Figure 14 is a diagram of the smart card 180 that may be incorporated into the  
21    terminal 140 of Figures 4a-4c. For example, the smart card 180 may be incorporated  
22    into the television 171 of Figure 4b or the television 177 of Figure 4c. A  
23    microprocessor 181 controls all the functions of the smart card 180. A  
24    communications interface 183 provides communications with external sources such  
25    as a personal computer or a digital camera (not shown) through a RS-232 cable and  
26    connector (not shown), for example. The communications interface 183 may also be  
27    used to connect to the national broadcaster 110, or wireless means such as infra red  
28    or radio frequency signaling, for example. For communications with the national  
29    broadcaster 110, the communications interface 183 may include one or more of a one-  
30    way cable modem, a two-way cable modem, a telephone modem, a wireless modem,  
31    an ethernet connector, or a fiber optic connector, for example. A memory 185 stores

1 programming instructions for the microprocessor 181 and data provided by devices  
2 external to the smart card 180. The memory 185 may be a RAM, a SRAM, a  
3 SDRAM, an EEPROM or other suitable memory device. A connector 187 provides  
4 external communications with components of the set top terminal 220.

5 The programming instructions in the memory 185 may be updated by loading  
6 programming instructions from the local cable system 114, the broadcast affiliate 112,  
7 or the national broadcaster 110. The programming instructions may also be loaded  
8 from the web site 106. Thus, if the broadcast associate 112, for example, changes the  
9 way in which the programming 115 is provided, the broadcast associate 112 may send  
10 programming instructions along with the programming 115 to the terminals 140. The  
11 changed programming instructions may replace or modify programming instructions  
12 that are stored in the memory 185.

13 Also shown in Figure 14 is a data storage device 189. The data storage device  
14 189 may be removable, or may be affixed permanently to the smart card 180. The  
15 data storage device 189 may store program control information, program information,  
16 and subscriber specific data, for example. Program control information may be used  
17 to generate menu information for currently available programs. The program control  
18 information may also be used to control display of programs on the television 171.  
19 The program information may be a preview of an upcoming program, or may be the  
20 entire program or a portion of the entire program. For example, the first five minutes  
21 of all pay-per-view movies that are available in a given month may be stored in the  
22 data storage device 189. In this embodiment, once a program is selected, and  
23 authorized, the first part of the program is displayed, and the remaining portion of the  
24 program is supplied by the national broadcaster 110.

25 The smart card 180 may also include a cash card module (not shown). The  
26 cash card may be fixed or removable. The cash card may receive credits and debits  
27 from a remote locations such as the order and authorization system 179 and the billing  
28 system 194.

29 The data storage device 189 may also store entire programs. For example, the  
30 data storage device 189 may store one or more movies. In addition, the data storage  
31 device 189 may store advertisements, including advertisements targeted to the

1 subscriber. Targeted advertising is described in detail in copending applications  
2 Serial No. 08/735,549, entitled NETWORK CONTROLLER FOR CABLE  
3 TELEVISION DELIVERY SYSTEMS and in Serial No. 09/054,419, entitled  
4 TARGETED ADVERTISEMENT USING TELEVISION DELIVERY SYSTEMS  
5 the disclosures of which are hereby incorporated by reference.

6 The data storage device 189 may be programmed to record programs watched  
7 data and click stream data. The programs watched data may be used to target the  
8 advertisements and as part of a billing and account system. Data recorded on the data  
9 storage device 189 may be provided to a remote location such as the local cable  
10 company 114 in response to a polling request message. Alternately, the data storage  
11 device 189 may provide data to a remote source through another data transfer scheme  
12 such as carrier sense multiple access with collision detection/collision avoidance  
13 (CSMA/CD). Finally, the data storage device 189 may be taken to, or sent to the  
14 local cable company 114, for example, where its contents are read.

15 C. Menu System for Broadcast Program Ordering

16 A broadcast provider, such as the national broadcaster 110 may provide a  
17 menu of available programs, in the form of an electronic program guide (EPG). The  
18 program guide may be provided on a broadcast channel, and is displayed at the  
19 terminal 140 so that a subscriber can select a program for viewing. The program  
20 guide may also be provided at the web site 106 on the Internet 105. Finally, rather  
21 than an electronic program guide, the menu may be provided in a hard copy format,  
22 with program codes listed.

23 When the program guide is broadcast by the broadcast provider, the program  
24 guide may be displayed on a subscriber's television. This situation is shown in Figure  
25 10. In particular, the set top terminal 220 and the smart card 180 may receive the  
26 program guide. In this embodiment, the program guide may be provided as program  
27 data. One or more program guide templates may then be used in the set top terminal  
28 220 and the smart card 180 to generate the program guide. Details for generating the  
29 program guide, or menu, using the program guide data and the template are provided  
30 later. Alternately, the program guide may be provided by the broadcast provider and  
31 displayed directly on the television 170 and the television 171.



1           When the program guide is provided on the web site 106, the program guide  
2           may be downloaded to the subscriber's computer, such as the personal computer 172,  
3           shown in Figure 11. The program guide may also be downloaded to the set top  
4           terminal 220 and the smart card 180 shown, for example in Figure 11, and may be  
5           displayed on the television 170 and the television 171, respectively.

6           An entire listing of available programs versus time of viewing may be too  
7           large to be easily displayed on a television display. The program guide 300, shown  
8           in Figure 8, may therefore be scrolled using the cursor keys of the remote control 900,  
9           for example, to allow the display of future television programming. For example, the  
10          program guide 300 may be scrolled to display television programming scheduled for  
11          viewing eight hours or 24 hours in the future. If the number of available channels is  
12          also too large to be easily displayed, the channels may also be scrolled using the  
13          cursor keys of the remote control 900.

14          Figures 15a-15d are alternate examples of electronic program guides that may  
15          be used with the broadcast environment of Figure 1. Figure 15a shows an alternate  
16          program guide 310 that lists available program choices. In Figure 15a, an upper  
17          window 311 identifies the program provider, such as the national broadcaster 110.  
18          Additional information such as time and date information may also be provided in the  
19          upper window 311. Finally, a hypertext link or logo (shown in Figure 15 a as a star),  
20          or hot button to a web site may be included in the upper window 311. The web site  
21          may contain additional information about the program provider, preview information  
22          regarding upcoming programs, special features such as a package of NFL games that  
23          a subscriber can purchase, promotional programs and other advertising. A central  
24          window 313 displays program choice information. For example, the central window  
25          313 could display available programs by title. The control window 313 could also  
26          include additional information such as program rating, next available viewing time,  
27          and channel number, for example. A lower window 315 may contain access buttons  
28          that allow the subscriber to access other submenus or menus related to the program  
29          guide 310. For example, the lower window could include a "go back" button that  
30          returns the subscriber to the previous menu, a "forward" button that sends the  
31          subscriber to the next submenu in the sequence of menus, if available, a "return to

1 program" button that returns the display to the last selected channel, and an  
2 interactive button that allows the subscriber to access interactive services including  
3 access to the Internet 105 and other online services, and Internet service providers.

4 Alternately, operation of the go button may cause a submenu to be displayed.  
5 Figure 15b shows an order submenu 320 that is displayed when the go button of the  
6 remote control 900 is operated. The order submenu 320 includes a program  
7 description window 321 that may provide a textual description of the selected  
8 program. The window 321 may also display a video clip or a still image related to the  
9 selected program. Additional windows, or banners may also be incorporated into the  
10 order submenu 320. A top window 322 may provide additional program information  
11 such as rating, start and stop times of broadcast, and current time and date  
12 information, for example. A bottom window 323 may incorporate soft keys and text  
13 that prompt the viewer to select one of order program or return to the program guide  
14 310. The bottom window 323 may also include additional features, by way of soft  
15 keys, such as automatic "tune to program channel," "turn television on," and "record  
16 program button." Referring to Figure 3, the "automatic tune" command causes the  
17 tuner 166 to be tuned to the appropriate broadcast channel prior to the start time of  
18 the program, for example, one minute prior to start. Alternately, the processor 161  
19 may create a virtual channel prior to the program start, and cause the tuner to tune to  
20 the virtual channel just prior to the program start. If the television is off at the time  
21 of the program start, the command "turn television on" causes the processor 161 to  
22 turn the television on so that the selected program may be viewed. The command  
23 "record program", if selected, may cause the processor 161 to begin recording the  
24 program on a VCR or other suitable recording device, for example. The television  
25 need not be on for the record program order to be executed. In this case, the  
26 processor 161 either creates a virtual channel, or causes the tuner to tune to the  
27 appropriate broadcast channel just prior to the start of the program. The order  
28 submenu 320 may also incorporate a feature that allows viewing of a program at one  
29 of several start times, as selected by the viewer. For example, a movie broadcast on  
30 a channel may be shown every three hours throughout a day, and the viewer has the  
31 option of selecting a start time. Alternately, the viewer may select a program for

1 viewing, and be authorized to view the program at any time of the day. In this  
2 alternative, the viewer may select the time that recording occurs.

3 While the above features may be incorporated into a window of the order  
4 submenu, one or more of the features may also be incorporated into another submenu,  
5 such as a confirm order submenu 330 shown in Figure 15c.

6 In another embodiment, the electronic program guide may be displayed as a  
7 channel lineup menu 340 as shown in Figure 15d. In Figure 15d, programs are listed  
8 in a column format with the associated broadcast channel indicated. This allows  
9 some subscribers to manually tune to a particular channel to receive a program.

10 The channel lineup menu 340 includes program titles and may include  
11 program ratings, times of broadcast start, length of program and cost, for example.  
12 A subscriber selects a desired program by scrolling through the program list using the  
13 scroll buttons on the remote control 900. When the scrolling stops, the program is  
14 highlighted on the menu. The subscriber may then order the selected program by  
15 operating the go button on the remote control 900. Referring to Figure 10, for  
16 example, operation of the go button sends the order signal 190 to the order and  
17 authorization system 179. The order and authorization system 179 acts on the order  
18 signal 190, sending the local authorization code 197'. The terminal 140 that initiated  
19 the order signal 190 receives the local authorization code 197', which includes the  
20 address and identification of the terminal 140 that sent the order signal 190. The local  
21 authorization code 197' may be stored in the memory of the terminal 140, or may be  
22 used immediately to access the authorized program.

#### 23 D. Operation of the Broadcast Program Ordering System

24 Figure 16 is a flow chart of the major steps associated with ordering and  
25 receiving a pay-per-view program, and the subsequent billing cycle. The flow chart  
26 assumes the broadcast environment 131 of Figure 11.

27 The process begins with step S100. In step S110, the set top terminal 220  
28 accesses the web site 106. The web site 106 may be accessed by entering the address  
29 of the web site 106 into a location window of a web browser, by activating a  
30 hypertext link provided during the broadcast of current programming, and by activating

1 a hypertext link received from a different web site. The process then moves to step  
2 S120.

3 In step S120, a data signal showing the web site 106 home page is transmitted  
4 to the set top terminal 220, and the web site 106 home page is displayed on the  
5 display of the television 170. The process then moves to step S130. In step S130, the  
6 web site 106 receives the order signal 190 for a program selected by a subscriber.  
7 The order signal 190 includes a program identifier and the address and identification  
8 of the set top terminal 220. The process then moves to step S140.

9 In step S140, the web site 106 transmits the authorization request 196 to the  
10 ordering and authorization system 179. The process then moves to step S150. In step  
11 S150, the order and authorization system 179 determines if the set top terminal from  
12 which the order signal 190 originated is authorized to receive the selected program.  
13 The order and authorization system 179 may compare the rating of the selected  
14 program to a preset rating limit provided by the subscriber, for example. The order  
15 and authorization system 179 may determine if the subscriber's account is delinquent.  
16 If the set top terminal 220 is not authorized to receive the selected program, the  
17 process moves to step S160. Otherwise, the process moves to step S170.

18 In step S160, the order and authorization system 179 sends a message to the  
19 set top terminal 220 stating that the selected program cannot be accessed, along with  
20 the reason for no access. The process then moves to step S260 and ends.

21 In step S170, the order and authorization system 179 sends an authorization  
22 signal 191 to the network controller 214. The process then moves to step S180. In  
23 step S180, the network controller 214 multiplexes the local authorization code 197'  
24 with the programming 197. The process then moves to step S190. In step S190, the  
25 set top terminal 220 receives the local authorization code 197' and stores the local  
26 authorization code 197' in the memory of the set top terminal 220. The process then  
27 moves to step S200.

28 In step S200, the set top terminal 220 tunes to the channel carrying the  
29 program for which the authorization signal applies. The program is then displayed  
30 on the display of the television 170. The process then moves to step S210. In step  
31 S210, the order and authorization system 179 starts a time out, with the beginning of

1 the time out corresponding to the start time of the displayed program. The process  
2 then moves to step S220. In step S220, the time out has ended, and the order and  
3 authorization system 179 determines if a cancel program order 192 has been received  
4 from the set top terminal 220. If the cancel program order 192 has been received, the  
5 process moves to step S230. Otherwise the process moves to step S250.

6 In step S230, the order and authorization system 179 sends a cancel program  
7 signal 191" to the network controller 214. The process then moves to step S240. In  
8 step S240, the network controller 214 sends a deauthorization signal 193 to the set top  
9 terminal 220, and the set top terminal 220 tunes away from the now deauthorized  
10 program. The process then moves to step S260 and ends.

11 In step S250, the time out has been completed without receipt of a cancel  
12 program order 192, the order and authorization system 179 send a billing record to  
13 the billing system 194. The process then moves to step S260 and ends.

#### 14 E. Menu-Driven Program Selection

15 In a broadcast television environment, a menu-driven program selection  
16 scheme may provide the subscriber with one-step access to all major menus, ranging  
17 from hit movies to sport specials to specialty programs. From any of the major  
18 menus, the subscriber can in turn access submenus and minor menus by cursor or  
19 alpha-character access.

20 Different types of menus may be used in the broadcast television environment.  
21 These menus include Program Selection menus and During Program menus. The first  
22 series of menus, Program Selection menus, consists of an Introductory menu, a Home  
23 menu, Major menus, and Submenus. The second series of menus, During Program  
24 menus, consists of two primary types, Hidden menus and the Program Overlay  
25 menus.

26 Immediately after the subscriber turns on the set top terminal 220, or the  
27 television 170 of Figure 10, for example, the Introductory menu welcomes the  
28 subscriber to the system. The Introductory menu may display important  
29 announcements from the local cable system 114 shown in Figure 1, advertisements  
30 from the national broadcaster 110, or other types of messages. In addition, the

1       Introductory menu can inform the subscriber if the cable headend 208 has sent a  
2       personal message to the subscriber's particular set top terminal 220.

3               After the Introductory menu has been displayed the subscriber may advance  
4       to the next level of menus, namely the Home menu. In an embodiment, after a certain  
5       period of time, the menu system will advance by default to the Home menu. From  
6       the Home menu, the subscriber is able to access all of the programming options. The  
7       subscriber may either select a program directly by entering the appropriate channel  
8       number from the remote control 900, or the subscriber may sequence through  
9       incremental levels of menu options starting from the Home menu. The Home menu  
10      lists categories that correspond to the first level of menus called Major menus.

11             If the subscriber chooses to sequence through subsequent menus, the  
12      subscriber will be forwarded to the Major menu that corresponds to the chosen  
13      category from the Home menu. The Major menus further refine a subscriber's search  
14      and help guide the subscriber to the selection of his choice.

15             From the Major menus, the subscriber may access several submenus. From  
16      each submenu, the subscriber may access other submenus until the subscriber finds  
17      a desired television program. Similar to the Major menu, each successive level of  
18      Submenus further refines the subscriber's search. The system also enables the  
19      subscriber to skip certain menus or submenus and directly access a specific menu or  
20      television program by entering the appropriate commands on the remote control 900.

21             The During program menus (including Hidden menus and Program  
22      Overlay menus) are displayed by the set top terminal 220 only after the subscriber has  
23      selected a television program. In order to avoid disturbing the subscriber, the set top  
24      terminal 220 does not display the Hidden menus until the subscriber selects the  
25      appropriate option to display a Hidden menu. The Hidden menus contain options that  
26      are relevant to the program selected by the subscriber. For example, a Hidden may  
27      contain options that enable a subscriber to enter an interactive mode or escape from  
28      the selected program.

29             Program Overlay menus are similar to Hidden menus because they occur  
30      during a program and are related to the program being viewed. However, the  
31      Program Overlay menus are displayed concurrently with the program selected by the

1 subscriber. Most Program Overlay menus are small enough on the screen to allow  
2 the subscriber to continue viewing the selected program comfortably.

3 As summarized above, images or programs may be selected for display by  
4 sequencing through a series of menus. Figure 17 is an example of one possible  
5 structure for a series of menus. Generally, the sequence of menus is structured with  
6 an Introductory menu, a Home menu, various major menus and a multitude of  
7 submenus. The submenus can include promotional menus and During Program  
8 menus. For example, at the Home menu portion of the sequence of menus and  
9 corresponding software routines, a subscriber may select one of the Major menus and  
10 start a sequence of menu displays. Alternatively, a subscriber may go directly to a  
11 major menu by depressing a menu select button on remote control 900.

12 At any time during the menu sequence, the subscriber may depress a Major  
13 menu button to move into another series of menus. In this way, a subscriber may  
14 move from Major menu to Major menu.

15 Shown in Figure 17 is a Major menu 1046 for the national broadcaster 110.  
16 The Major menu 1046, and the accompanying submenus, allow the national  
17 broadcaster's electronic program guide, such as the program guide 310 of Figure 15a,  
18 to be incorporated into the menu driven program access system. Alternately, the  
19 national broadcaster's electronic program guides could be provided as a stand-alone  
20 product.

21 The various software subroutines executed by the set top terminal 220 allow  
22 a subscriber to sequence the menus, navigating through the various menus of the  
23 present invention. A subscriber may sequence back through menus or return to the  
24 Home menu with a single touch of the Home menu button on remote 900.

25 An Introductory menu screen 1000 automatically appears upon power-up and  
26 initialization of the set top terminal 220. From this Introductory menu screen 1000,  
27 the set top terminal software will normally advance the subscriber to the Home menu  
28 screen 1010. The Home menu 1010 is the basic menu that the subscriber will return  
29 to in order to make the first level of viewing decisions. When the set top terminal  
30 software is displaying the Home menu 1010, the subscriber is able to access any  
31 television programming option. The software allows programming options to be

1 entered through cursor movement on the screen and directly by button selection on  
2 the remote control 900.

3 In the normal progression through the menu screens, the software will forward  
4 the subscriber to a Major menu screen 1020 in response to the subscriber's remote  
5 control 900 selection or highlighted cursor selection from the Home menu screen  
6 1010. The selections displayed on the Home menu 1010 are for large categories of  
7 programming options.

8 Following the Major menu 1020, the subscriber may navigate through one or  
9 more submenu screens 1050 from which the subscriber may choose one particular  
10 program for viewing. For most programming selections, the subscriber will proceed  
11 from the Home menu 1010 to a Major menu 1020 and then to one or more submenus  
12 1050. However, for certain programming options or functions of the set top terminal  
13 220, the subscriber may skip one or more menus in the sequence.

14 The During Program menus are submenus enabled by the set top terminal  
15 software only after the subscriber has selected a television program. These menus  
16 provide the subscriber with additional functionality and/or additional information  
17 while viewing a selected program. The During Program menu sequence can be  
18 further subdivided into at least two types of menus, Hidden menus 1380 and Program  
19 Overlay menus 1390.

20 To avoid disturbing a subscriber during viewing of a program, the Hidden  
21 menus 1380 are not shown to the subscriber but instead "reside" at the set top  
22 terminal 220. The set top terminal 220 awaits a button entry either from the remote  
23 control 900 or the set top terminal 220 buttons before executing or displaying any  
24 Hidden menu 1380 options. The set top terminal software provides the subscriber  
25 with additional functions such as entering an interactive mode or escaping from a  
26 selected program through use of Hidden menus 1380.

27 Program Overlay menus 1390 are similar to Hidden menus 1380. However,  
28 the Program Overlay menus 1390 are overlaid onto portions of the displayed video  
29 and not hidden. The software for the Program Overlay menus 1390 allows the  
30 subscriber to continue to watch the selected television program with audio but places  
31 graphical information on a portion of the television screen. Most Program Overlay



1        menus 1390 are graphically generated to cover small portions of video. Some  
2        Program Overlay menus 1390, which are by their nature more important than the  
3        program being viewed will overlay onto greater portions of the video. Examples of  
4        types of Program Overlay menus 1390 include Notification menus 1392 and  
5        Confirmation menus 1394. In an embodiment, the software for the Program Overlay  
6        menus 1390 controls the reduction or scales down the (entire) programs video and  
7        redirects the video to a portion of the screen.

8                Submenus may provide the cost of viewing the program and the program's  
9        length in hours and minutes. From the submenu, the subscriber is given at least three  
10       options: (1) to purchase a program, (2) to return to the previous menu, and (3) to press  
11       "go" and return to regular TV. The subscriber may also be given other options such  
12       as previewing the program.

13               Using an on-screen menu approach to program selection, there is nearly an  
14       unlimited number of menus that can be shown to the subscriber. The memory  
15       capability of the set top terminal 220 and the quantity of information that is sent using  
16       the program control information signal are the only limits on the number of menus  
17       and amount of information that can be displayed to the subscriber. The approach of  
18       using a series of menus in a simple tree sequence is both easy for the subscriber to use  
19       and simply implemented by the set top terminal 220 and remote control device 900  
20       with cursor movement. A user interface software programmer will find many obvious  
21       variations from the preferred embodiment described.

22               The set top terminal 220 may generate and create menus using, in part,  
23       information stored in its graphics memory. Referring to Figures 18a-18c, a  
24       background graphics file 800 will store menu backgrounds and a logo graphics file  
25       820 will store any necessary logos. A menu display and cursor graphics file 850 will  
26       store menu display blocks and cursor highlight overlays as well as any other  
27       miscellaneous files needed to build the menus. Using this method of storing menus,  
28       the menus can be changed by reprogramming a graphics memory 620 of the set top  
29       terminal 220 through instructions from either the network controller 214 or operations  
30       center 202.

1           A microprocessor in the set top terminal 220 performs the steps required to  
2       create a menu using stored information. The microprocessor fetches a background  
3       file, logo file, menu display and cursor file in most instances. The microprocessor  
4       fetches text from long-term 875, intermediate-term 877, or short-term 879 storage  
5       depending on where the text is stored. Using a video combiner 886 (or like device),  
6       the stored information is combined with video and the entire image is sent to the  
7       television screen 888 for display.

8           In an embodiment, a graphics controller is used to assist the set top terminal  
9       220 in generating menus. Menu generation by the set top terminal 220 begins with  
10      the building of a Major menu screen, which includes background graphics for that  
11      Major menu 1020. The background graphics may include an upper window across  
12      the top of the screen and a lower window across the bottom of the screen. The  
13      background graphics may be generated from the background graphics file 800 in the  
14      memory files of the graphics memory. In addition, logo graphics may be generated.  
15      Such graphics may include an icon window, a cable company logo, a channel  
16      company logo, and two "go" buttons.

17           The text for each Major menu 1020 may be generated separately by a text  
18      generator in the set top terminal 220. Those portions of the text that generally remain  
19      the same for a period of weeks or months may be stored in EEPROM or other local  
20      storage. Text that changes on a regular basis, such as the movie titles (or other  
21      program selections), is transmitted to the set top terminal 220 by either the operations  
22      center 202 or the network controller 214 of the cable headend 208. In this manner,  
23      the cable headend 208 may change the program selections available on any Major  
24      menu 1020 by modifying the program control information signal sent by the  
25      operations center 202 and transmitting any changes using a set top terminal control  
26      information signal (STTCIS).

27           Day, date and time information may be added to each Major menu 1020. This  
28      information is sent from the operations center 202, the cable headend 208 (signal  
29      processor 209 or network controller 214), the uplink site, or generated by the set top  
30      terminal 220 internally.

1           The creation and display of program description submenus is performed by  
2           the set top terminal 220 in a manner similar to that described above. Each submenu  
3           may be created in parts and combined before being sent to the television screen.  
4           Background graphics and upper and lower windows may be used. Likewise, a video  
5           window and half-strip window can be generated from information in storage on the  
6           EEPROM.

7           In addition to graphics and text, some submenus include windows that show  
8           video. Such video may be still or moving pictures. Still pictures may be stored in a  
9           compressed format (such as JPEG) at the set top terminal 220. Video stills may be  
10          transmitted by the operations center 202 through the program control information  
11          signal from time to time.

12          Moving video pictures may be obtained directly from a current video feed as  
13          described above. Depending on video window size, this may require manipulation  
14          of the video signal, including scaling down the size of the video and redirecting the  
15          video to the portion of the menu screen which is within the video window of the  
16          menu. Alternatively, the video may be obtained from a split screen channel. Such  
17          a method involves the use of split screen video techniques to send multiple video  
18          clips on a single channel at a given time. The set top terminal 220 would scale the  
19          picture, if necessary, and redirect it to the correct position on the screen using known  
20          scaling and positioning techniques. Additional circuitry may be required in the set  
21          top terminal 220 to perform adequate scaling and repositioning.

22          To avoid the need for redirecting video into the portion of the screen which  
23          houses the video window, masking and menu graphics may be used to cover the  
24          portions of the channel video that are not needed. This masking technique allows the  
25          split screen video to remain in the same portion of the screen that it is transmitted by  
26          the operations center 202. The masking is then adjusted to cover the undesired  
27          portions of the screen. These masks are stored in the background graphics file  
28          similarly to other background files for menus.

29          The split screen video technique may also be used for promoting television  
30          programming. Since a great number of short video clips may be sent continuously,  
31          full or partial screen promotionals (or informationals) may be provided to the

1 subscriber. With this large quantity of promotional video, the subscriber is given the  
2 opportunity to "graze" through new movie or television programming selections. The  
3 subscriber simply grazes from promotional video to promotional video until the  
4 desired television program is discovered.

5 F. Detailed Set Top Terminal Description

6 The set top terminal 220 receives and manipulates signals from the cable  
7 headend 208. The set top terminal 220 is equipped with local computer memory and  
8 the capability of interpreting the digitally compressed signal to produce menus for the  
9 subscriber. The remote control 900 communicates the subscriber's selections to the  
10 set top terminal 220. The subscriber's selections are generally based upon menus or  
11 other prompts displayed on the television screen.

12 Figure 19 shows the basic hardware components of the set top terminal 220.  
13 The set top terminal 220 has a tuner 603, digital demodulator 606, decryptor 600, and  
14 demultiplexers 609, 616 as well as audio equipment 612 and a remote control  
15 interface 626 for receiving and processing signals from the remote control unit 900.  
16 A modem 627 allows communication between a microprocessor 602 and the cable  
17 headend 208. An NTSC encoder 625 provides a standard NTSC video output.

18 The microprocessor 602 is capable of executing program instructions stored  
19 in memory. These instructions allow a subscriber to access various menus by making  
20 selections on the remote control 900.

21 The manner in which the video is decompressed and the menus are generated  
22 from the program control information signal or STTCIS varies depending on the  
23 specific embodiment of the invention. Video decompressors 618 and 622 may be  
24 used if the video is compressed. The program control information signal may be  
25 demultiplexed into its component parts, and a video decompressor 618, graphic  
26 decompressor, text generator and video combiner 624 may be used to assist in  
27 creating the menus.

28 In addition to the menu format information that is stored in graphics memory,  
29 the set top terminal 220 also stores data tracking those programs that have been  
30 selected for viewing. By gathering this data, the set top terminal 220 can maintain an  
31 accurate record of all programs accessed/watched by storing the data in EEPROM or

1 RAM. Subsequently, this data can be transmitted to the cable headend 208, where it  
2 can be used in carrying out network control and monitoring functions. Such data  
3 transmissions between the set top terminal 220 and cable headend 208 can be  
4 accomplished, for example, through upstream transmission over the cable network  
5 or over telephone lines through the use of telephone modems. Where upstream  
6 transmission over the cable network is used, the set top terminals 220 can complete  
7 data transmissions on a scheduled (e.g., using a polling response or status report to  
8 respond to polling requests sent from the cable headend 208) or as-needed (e.g., using  
9 a random access technique) basis.

10 Figure 20a shows the front panel of the set top terminal 220, which includes  
11 an infrared sensor 630 and a series of LED displays 640. The LED displays 640 may  
12 indicate with an icon or a letter (e.g. A-K) the Major menu currently selected by the  
13 set top terminal 220 or the channels selected directly by a subscriber, or menu channel  
14 selections (e.g., from 1 to 50). Further displays may include current channel, time,  
15 volume level, sleep time, parental lock (security), account balance, use of a hardware  
16 upgrade, second channel being recorded by the VCR, use of the Level D music  
17 hardware upgrade in a separate room, a channel being viewed on another television  
18 that is coupled to the set top terminal 220, and any other displays useful to a  
19 subscriber to indicate the current status of the set top terminal 220. The LEDs 640  
20 may also provide an indication of the digital audio channel currently tuned.

21 The set top terminal 220 includes a flapped opening 635 on its front that  
22 allows the insertion of a magnetic cartridge (or similar portable storage device,  
23 including optical disk, ROM, EPROM, etc. not shown). This cartridge opening 635  
24 allows the set top terminal 220 to be upgraded or reprogrammed locally with the use  
25 of a magnetic tape cartridge.

26 On the top or cover of the set top terminal 220 are located pushbutton controls  
27 645. Any function that can be performed on the remote 900 may also be performed  
28 at the set top terminal 220 using the duplicative pushbutton controls 645.

29 Figure 20b shows the back of the set top terminal 220, which includes a pair  
30 of output terminals 650, pair of input terminals 652, pair of stereo/audio output  
31 terminals 654, satellite dish input port 656, telephone jack 658 and an RS-422 port

1       660. In addition, an upgrade port 662 and a cover plate 664 are held in place by a  
2       series of sheet metal screws. One of the output terminals 650 is for a television and  
3       the other is for a VCR or other video recording device. The set top terminal 220 is  
4       equipped to handle incoming signals on one or two cables using the input terminals  
5       652. The phone jack 658 and an RS-232 or RS-422 port 660 are provided for  
6       maintenance, trouble shooting, reprogramming and additional customer features, such  
7       as connection to a digital camera. In alternate embodiments, the telephone jack 658  
8       may be used as the primary mode of communication between the cable headend 208  
9       and the set top terminal 220. This connection is possible through the local telephone,  
10      cellular telephone or a personal communications network (PCN).

11       The basic programming of each set top terminal 220 is located on ROM  
12      within the set top terminal 220. Random access memory, the magnetic cartridge  
13      capability, and the expansion card slot 635 each allow upgrades and changes to be  
14      easily made to the set top terminal 220. The upgrade cards may be daisy-chained  
15      together to provide greater functionality for the set top terminal 220.

16       In an embodiment, the set top terminal 220 includes a hardware upgrade port  
17      662, in addition to expansion card slots. The hardware upgrade port 662  
18      accommodates a four-wire (or more) connection for: (1) error corrected, decrypted  
19      data output of the set top terminal 220, (2) a control interface, (3) decompressed video  
20      output, and (4) a video input port. In an embodiment, multiple wires are used to  
21      perform each of the four functions. The four sets of wires are combined in a single  
22      cable with a single multipin connector.

23       Multipin connections may be used for the multiwire cable. The multipin  
24      connection 662 may range from DB9 to DB25. A variety of small computer systems  
25      interface (SCSI) ports may also be provided. Alternatively, four or more ports may  
26      be provided instead of the single port depicted.

27       Another port 662 is used to attach the various hardware upgrades described  
28      below to a set top terminal 220. An embodiment has a number of hardware upgrades  
29      available for use with a set top terminal 220, including: (1) a Level A interactive unit,  
30      (2) a Level B interactive unit, (3) a Level C interactive unit with compact disc  
31      capability, (4) a Level D digital radio tuner for separate room use, and (5) a Level E

1 information download unit. Each of these upgrades may be connected to the set top  
2 terminal 220 unit through the upgrade port 662 described earlier. The same four  
3 wires in a single cable described earlier may be used.

4 Existing set top converter boxes such as those made by Scientific Atlanta or  
5 General Instruments are presently unequipped to handle the menu selection system  
6 of the present invention. Thus, hardware modifications are necessary in order to use  
7 the menu selection system with existing set top converter technology.

8 An upgrade card addition to a set top converter is depicted in Figure 21. The  
9 card 700 shown provides the additional functionality needed to utilize the menu  
10 system with existing set top converter technology. The primary functions the card  
11 700 adds to the set top converter are the interpreting of program control information  
12 signals, generating of menus, sequencing of menus, and, ultimately, the ability of the  
13 subscriber to select a channel through the menu system without entering any channel  
14 identifying information. The card 700 also provides a method for a remote location,  
15 such as the cable headend 208, to receive information on programs watched and  
16 control the operation of the set top converter 220 and the card 700. The programs  
17 watched information and control commands may be passed from the cable headend  
18 208 to the card 700 using telephone lines coaxial cable, fiber optic cable, wireless  
19 means and by satellite.

20 The primary components of the card 700 are a PC chip CPU 702, a VGA  
21 graphic controller 704, a video combiner 706, logic circuitry 708, NTSC encoder 710,  
22 a receiver 712, demodulator 714, and a dialer 716. The card 700 operates by  
23 receiving the program control information signal from the cable headend 208 through  
24 the coaxial cable. The logic circuitry 708 of the card 700 receives data, infrared  
25 commands, and synchronization signals from the set top converter. Menu selections  
26 made by the subscriber on the remote control 900 are received by the set top  
27 converter's infrared equipment and passed through to the card 700. The card 700  
28 interprets the infrared signal and determines the program (or menu) the subscriber has  
29 selected. The card 700 modifies the infrared command to send the program selection  
30 information to the set top converter 221. The modified infrared command contains  
31 the channel information needed by the set top converter 220. Using the phone line

1 and dialer 716, the card 700 is able to transmit program access information to the  
2 cable headend 208.

3 G. Program Control Information Signal

4 Throughout this application, the term "program control information" is used  
5 to indicate control information coming from the cable headend 208 to the set top  
6 terminal 220, whether it is sent directly from the operations center 202, processed by  
7 the network controller 214 and then forwarded to the set top terminal 220, or  
8 transmitted over telephone lines.

9 The program control information signal may reach the subscriber's home in  
10 a compressed format and be decompressed prior to viewing. Included in the delivered  
11 signal is information that enables equipment at the subscriber's home to display  
12 menus for choosing particular programs. The delivered program signal may also  
13 include the local authorization code, which allows for display of programs and  
14 channels of programming. Depending on the particular embodiment, the television  
15 program signal may arrive at the subscriber's home through one or more connections  
16 such as coaxial cables, T1 and T3 lines, Integrated Services Digital Network (ISDN)  
17 lines and Asymmetric Digital Signal Lines (ADSL) cables, twisted pairs, cellular  
18 telephone connections, local area networks, direct satellite broadcasts, terrestrial  
19 broadcasts, or personal communications network (PCN) hookups.

20 The program control information signal is generated by the operations center  
21 202 and provides the network controller 214 with data on the scheduling and  
22 description of programs. In an alternate configuration, this data is sent directly to the  
23 set top terminal 220 for display to the subscriber. In an embodiment, the program  
24 control information signal is stored and modified by the network controller 214 and  
25 sent to the set top terminal 220 in the form of the STTCIS. The set top terminal 220  
26 integrates either the program control information signal or the STTCIS with data  
27 stored in the memory of the set top terminal 220 to generate on-screen menus that  
28 assist the subscriber in choosing programs for display.

29 The types of information that can be sent using the program control signal  
30 include: number of program categories, names of program categories, what channels  
31 are assigned to a specific category (such as specialty channels), names of channels,



1 names of programs on each channel, program start times, length of programs,  
2 description of programs, menu assignment for each program, pricing, whether there  
3 is a sample video clip for advertisement for the program, and any other program,  
4 menu or product information. As noted above, the program control signal may also  
5 include local authorization codes.

6 With a minimal amount of information being communicated to the set top  
7 terminal 220 on a regular basis, the set top terminal 220 is able to determine the  
8 proper menu location for each program and the proper time and channel to activate  
9 for the subscriber after a menu selection. The program control information signal and  
10 STTCIS can be formatted in a variety of ways and the on-screen menus can be  
11 produced using many different methods. For instance, if the program control  
12 information signal carries no menu format information, the menu format for creating  
13 the menus can be fixed in ROM at the set top terminal 220. In an embodiment, the  
14 menu format information is stored at the set top terminal 220 in a temporary memory  
15 device such as a RAM or EPROM. New menu format information is sent via the  
16 program control information signal or the STTCIS to the set top terminals 200  
17 whenever a change to a menu format is desired.

18 In an embodiment, the menu formats remain fixed and only the text changes.  
19 In this way the program control information signal can be limited to primarily text and  
20 a text generator can be employed in the set top terminal 220. Another simple  
21 embodiment uses a separate channel full-time (large bandwidth) just for the menu  
22 information.

23 Live video signals may be used in windows of certain menus. These video  
24 signals can be transmitted using the program control information signal or STTCIS,  
25 or can be taken off channels being transmitted simultaneously with the menu display.  
26 Video for menus, promos or demos may be sent to the set top terminal 220 in several  
27 formats, including (1) on a dedicated channel, (2) on a regular program channel and  
28 scaled to size, or (3) along with the program control information signal. For example,  
29 a large number of short promos or demo video may be sent using a split screen  
30 technique on a dedicated channel. A multiple window technique may be used with

1 the menus to display a description of a program and one or more video frames that  
2 assist the subscriber in selecting the program.

3 The program control information signal generated by the operations center 202  
4 provides data on the scheduling and description of programs to the network controller  
5 214 or, in an alternate configuration, directly to the set top terminal 220 for display  
6 to the subscriber. In an embodiment, the program control information signal is stored  
7 and modified by the network controller 214 and sent to the set top terminal 220 in the  
8 form of the STTCIS. This configuration is required to accommodate differences in  
9 individual cable systems and possible differences in set top terminal devices. The set  
10 top terminal 220 integrates either the program control information signal or the set top  
11 terminal control information stream together with data stored in the memory of the  
12 set top terminal 220, to generate on-screen displays for assisting the subscriber in  
13 choosing programs.

14 The goal of the menu driven program selection system is to allow the  
15 subscriber to choose a program by touring through a series of menus, organized  
16 generally as depicted in Figure 17, utilizing the remote control 900 for cursor  
17 movement. The final choice in the series of menus will identify one particular  
18 channel and one time for activation of that channel. Armed with a channel and  
19 activation time the set top terminal 220 can display the selected program on the  
20 television for the subscriber. To achieve this goal an intelligent alpha-numeric code  
21 is assigned to each program. This alpha-numeric code identifies the category of the  
22 program, the menu in which the program should be displayed, its transmission  
23 time(s), and the position on the menu that the program should be displayed.

24 The program control information, including menu codes, may be sent  
25 continuously from the operations center 202 to the network controller 214, and  
26 ultimately to the set top terminal 220.

27 Table A shows the basic programming information that may be sent to the set  
28 top terminal 220. The program descriptions shown are coded abbreviations. For  
29 example, C for comedy, N for news, S for sports, A for cartoons, and Tx for text. If  
30 there is a textual description for a program, such as a movie, the description may be  
31 given following that program's coded description or may be communicated following

the four hours' worth of programming information. As is shown in the coded listing, program descriptions for programs greater than a half hour in length need not be repeated (each half hour). The video description code informs the set top terminal 220 of whether there is still or live video available to advertise the program.

For example, a sporting program may be assigned a code of B35-010194-1600-3.25-Michigan St. vs. USC. The letter B would assign the program to category B, sports. The second alpha-numeric character number 3 would assign the program to the third menu of the sports category. The third character of the code, number 5, assigns the program to the fifth program slot on the third menu. The next six characters, 01/01/94, represent the date. The following four characters, 1600 represent the start time which is followed by the length of the program and the program name. This entry represents a sports show, a college football game, which will be aired at 4:00PM on New Years day 1994.

**TABLE A**

**12:00 PM**

*Ch.	*Program name	*Program length	*Menu code	*Description	*Video
1	Cheers	.5	E24	C	N
2	Terminator	2.0	A33	Tx	S
3	PrimeTime	1.0	D14	N	N
4	Football Special	.5	B24	S	N

**12:30 PM**

*Ch.	*Program name	*Program length	*Menu code	*Description	*Video
1	Simpsons	.5	E14&C13	C	S
4	Football Game	3.0	B13	S	N
•					
•					

In the 12:30 Channel 1 entry of Table A, two menu codes are shown. By allowing two menu codes, programs that may fit under two different category descriptions may be shown in both menus to the subscriber. With this minimal

amount of information being communicated to the set top terminal 220 on a regular basis, the terminal is able to determine the proper menu location for each program and the proper time and channel to activate for the subscriber after his menu selection.

In the 12:30 Channel 1 entry of Table A, two menu codes are shown. By allowing two menu codes, programs that may fit under two different category descriptions may be shown in both menus to the subscriber. With this minimal amount of information being communicated to the set top terminal 220 on a regular basis, the terminal is able to determine the proper menu location for each program and the proper time and channel to activate for the subscriber after his menu selection.

Table B shows an example Events Table that may be downloaded to a set top terminal 220 using the Event.Dat file which contains information about events and

**TABLE B**

Field #	Field Type	
1	Event Type 1 = YCTV 2 = Pay-Per-View 3 = Reg. TV	Unsigned Int
2	Event ID	Unsigned Int
3	Global Channel ID	Unsigned Int
4	Price (in Cents)	Unsigned Int
5	Start Time	HH:MM:SS
6	End Time	HH:MM:SS
7	Start Date	MM/DD/YY
8	End Date	MM/DD/YY
9	P-Icon	ASCIIZ
10	Name	ASCIIZ
11	Description	ASCIIZ

pricing. As shown in the table, the three columns of the Events Table identify the field number, the field itself and the type of information downloaded in the Event.Dat file. The first column contains the field numbers 1 through 11. The middle column contains the corresponding field parameters, including the event type, event ID, global channel ID, price, start time, end time, start date, end date, P- icon, name and description. The third column contains corresponding field type information. Field type information typically consists of an unsigned integer; hours, minutes and seconds; months, day and year; and ASCII character identifier.

Table C shows an example Event.Dat data file. In particular, Table C shows two data streams corresponding to two event types. The first data stream identifies a YCTV™ event in the first field. The second field designates the event ID, which is 1234 in this example. The third field includes the global channel ID number two. The fourth field indicates the cost of 50 cents for this event. The fifth and sixth fields indicate the respective start and end times of 3:00 AM to 3:00 PM, respectively. The seventh and eighth fields show the corresponding start and end dates, designated as 8/25/93 and 8/27/93, respectively. Field nine indicates the P-icon set to PBS.PCX graphics file. Finally, fields ten and eleven indicate the name and description of the events selected, which in this case are Sesame Street™ and Barney™. The second data stream in the Event.Dat example shown in Table C includes analogous information for Terminator IV™, which is designated in field one as a pay-per-view event.

TABLE C

**Event.Dat Example**

1`1234`2`50`03:00:00`15:00:00`08/25/93`08/27/93`pbs.pcx`Sesame Street & Barney's Sesame Street and Barney Abstract
2`1234`2`50`20:00:00`22:00:00`08/25/93`08/25/93`t4.pcx`Terminator 4`Terminator 4 Abstract

The program control information signal and STTCIS can be formatted in a variety of ways and the on-screen menus can be produced in many different ways. For instance, if the program control information signal carries no menu format information, the menu format for creating the menus can be fixed in ROM at the set top terminal 220. This method allows the program control information signal to carry less information but has the least flexibility since the menu formats can not be changed without physically swapping the ROM.

In an embodiment, the menu format information is stored at the set top terminal 220 in temporary memory either in a RAM, FLASH ROM, EEPROM or EPROM. This configuration provides the desired flexibility in the menu format while still limiting the amount of information needed to be communicated via the program control information signal. New menu format information can be sent via the program control information signal or the STTCIS to the set top terminals 220 each time there is a change to a menu.

1           Program access information for each program watched is stored at the set top  
2 terminal 220 until it is polled by the network controller 214 for information retrieval  
3 using the program control information signal or STTCIS. This information retrieval  
4 can be accomplished by using the polling request message and response formats, 920  
5 and 920' respectively, as shown, and Figures 22a and 22b, and described below, but  
6 any suitable polling request and response message format may be used to interrogate  
7 each set top terminal 220 sequentially, one by one. The set top terminals 220 are  
8 identified by a unique address and set top terminal identifier. The set top terminal  
9 220 may transmit information and messages to the network controller 214 only when  
10 given permission by the network controller 214 to do so.

11           Where, for example, specialty programs have been accessed since the  
12 previous poll, the set top terminal 220 is given permission to transmit a polling  
13 response 920' in the form of a status report that includes any such access information.  
14 The network controller's control receiver (not shown) is tasked with the receipt of set  
15 top terminal polling responses or status reports. These status reports generally include  
16 information that allows the network controller 214 to track a subscriber's program  
17 access history.

18           Figure 22a shows an embodiment of a frame format message 920 used for  
19 polling the set top terminals 220. This frame format 920 consists of six fields,  
20 namely: (1) a leading flag 922 at the beginning of the message, (2) an address field  
21 924, (3) a subscriber region designation 926, (4) a set top terminal identifier 928 that  
22 includes a polling command/response (or P/F) bit 930, (5) an information field 932,  
23 and (6) a trailing flag 934 at the end of the message.

24           The eight-bit flag sequence 922 that appears at the beginning and end of a  
25 frame is used to establish and maintain synchronization. Such a sequence typically  
26 consists of a "01111110" bit-stream. The address field 924 designates a 4-bit address  
27 for a given set top terminal 220. The subscriber region designation 926 is a 4-bit field  
28 that indicates the geographical region in which the subscriber's set top terminal 220  
29 is housed. The set top terminal identifier 928 is a 16-bit field that uniquely identifies  
30 each set top terminal 220 with a 15-bit designation followed by an appended P/F bit

1       930. Although field size is provided by this example, a variety of sizes can be used  
2       with the invention.

3             The P/F bit 930 is used to command a polling response from the set top  
4       terminal 220 addressed, as described below. The response frame format 920' also  
5       provides a variable-length information field 932' for other data transmissions, such  
6       as information on system updates. The frame format 920' ends with an 8-bit flag (or  
7       trailing flag) 934' that is identical in format to the leading flag 922', as set forth  
8       above. Other frame formats (e.g., MPEG) will be apparent to one skilled in the art  
9       and can be easily adapted for use with the system.

10            Figure 22b shows an example of frame format 920' for the status reports  
11       received from the set top terminals 220 during the polling cycle. This frame format  
12       is identical to the polling request message format 920 and, as described, includes: (1)  
13       a leading flag 922' at the beginning of the message, (2) an address field 924', (3) a  
14       subscriber region designation 926', (4) a set top terminal identifier 928' that includes  
15       a polling command/response (or P/F) bit 930', (5) an information field 932', and (6)  
16       a trailing flag 934' at the end of the message.

17            The information field 932' remains variable in length so that the status of an  
18       indeterminate number of programs, represented at 931, accessed can be included in  
19       the frame. In this way, the control message length of the polling request message is  
20       minimal since the network controller 214 does not transmit such access information.  
21       After a polling response by a given set top terminal 220, however, the control  
22       message length increases in proportion to the number of programs accessed.

23            During transmission, the P/F bit is used to carry out the polling function. In  
24       particular, the P/F bit is set to a "1" position to command a polling response from the  
25       set top terminal 220 whose address is identified in the frame. The set top terminal  
26       220 addressed must respond to the command in the same P/F bit also set to the "1"  
27       position. The response will include the number of programs accessed and their  
28       corresponding event identification numbers as shown in Figure 22b at 931. In cases  
29       where the set top terminal 220 has not accessed any programs since the previous  
30       polling cycle, the set top terminal 220 responds with the P/F bit set to "1" and the  
31       programs access block denoting zero programs accessed.

1           Through the polling cycle, the network controller 214 acquires the  
2 information needed to operate the system 200. During the polling cycle, the network  
3 controller 214 sends signals to the set top terminals 220 to authorize both their  
4 operation and access to specific channels. If, for example, a subscriber has failed to  
5 pay a recent bill, the network controller 214 can deauthorize the subscriber's set top  
6 terminal 220. Likewise, when the subscriber orders a program or channel, the  
7 network controller 214 checks the subscriber's account for good standing by reading  
8 the proper database file. After the check, the network controller 214 then either  
9 authorizes or deauthorizes access by the set top terminal 220. The authorization and  
10 deauthorization may be provided by any of the methods described with respect to  
11 Figures 10 - 12, for example. As a result, the cycle requires a series of requests and  
12 responses to operate.

13           A second method for the network controller 214 to receive information from  
14 the set top terminals 220 is through the use of a random access scheme. In this  
15 method, individual set top terminals 220 can send control-related messages to the  
16 network controller 214 without being polled. This scheme is particularly useful in  
17 networks where subscriber regions include potentially large numbers of subscribers.  
18 High concentrations of subscribers may be found, for example, in large metropolitan  
19 areas. In such cases, the polling cycle can be replaced with a more sophisticated  
20 random access strategy such as carrier-sense multiple access with collision detection  
21 (CSMA/CD). In this scheme, each set top terminal 220 must "listen" before it  
22 transmits and then does so only if it senses an idle medium. When the return link to  
23 the network controller 214 is silent, a given set top terminal 220 can transmit its  
24 messages. Any messages sent from a set top terminal 220 to the network controller  
25 214 would set the P/F bit 930' to a "0" position to indicate that the message is not in  
26 response to any command or polling request. In addition to CSMA/CD, other random  
27 access schemes can be used with the system, such as CDSL. Yet another method for  
28 the network controller 214 to receive information from the set top terminals 220 is  
29 through the use of modems. In this arrangement, the set top terminals 220  
30 communicate program access information and orders to the network controller 214  
31 using telephone modems. The set top terminals 220 are equipped with a modem port



1 to facilitate such operation. Thus, communications between a given set top terminal  
2 220 and the network controller 214 can be established over telephone lines or other  
3 media when cable traffic or other primary traffic is congested. A method includes  
4 using modems in combination with a control or "hit" signal from the network  
5 controller 214. A group (or region) of set top terminals 220 is "hit" simultaneously  
6 by the network controller 214 via the cable. Only those set top terminals 220 within  
7 the group that have data for the network controller 214 call the network controller 214  
8 by modem. The network controller 214 is equipped with a bank of modems  
9 (organized to roll-over telephone calls) to answer the incoming calls.

10 Among the methods discussed for the network controller 214 to receive  
11 information from the set top terminals 220, polling allows the network controller 214  
12 to conduct and control communications with set-top terminals 220 over the cable  
13 network in an orderly fashion. In particular, the network controller 214 can schedule  
14 data retrieval by polling the set top terminals 220 one by one. A random access  
15 method, on the other hand, does not allow the network controller 214 to maintain  
16 such orderly communications. Instead, the network controller 214 receives data from  
17 the set top terminals 220 at random, depending on when the cable medium is idle.  
18 This random reception of data lessens the degree of control that the network  
19 controller 214 has over set top terminal transmissions.

20 In between polling cycles, the program control information continues to  
21 supply the set top terminals 220 with menu information. In the simplest embodiment,  
22 the menus remain fixed and only the text changes. Thus, the program control  
23 information signal can be limited to primarily text and a text generator can be  
24 employed in the set top terminal 220. This simple embodiment keeps the cost of the  
25 set top terminal 220 low and limits the bandwidth necessary for the program control  
26 information. Another simple embodiment uses a separate channel full-time (large  
27 bandwidth) just for the menu information. This separate channel would facilitate the  
28 rapid downloading of new graphics for the system and would enhance response time  
29 when text and other data information needs to be changed.

30 In an embodiment, the basic building blocks or templates of the on-screen  
31 menu displays will be stored in graphics memory consisting of nonvolatile RAM,

1 FLASH ROM, EPROM, or preferably, EEPROM, as shown as 620 in Figure 18a.  
2 Referring to Figure 19, with the information from the graphics memory 620, the  
3 microprocessor 602, graphics decompressor 622, a text generator (not shown in  
4 Figure 19, but incorporated if necessary), and video combiner 624 will build a menu  
5 screen.

6 The memory files of the graphics memory are preferably categorized into  
7 three categories, background graphics 800, logo graphics 820, and menu and display  
8 graphics 850, as shown in Figure 18a.

9 The background graphics file 800 will store menu backgrounds such as:  
10 universal main menu backgrounds 804, universal submenu backgrounds 808, promo  
11 backgrounds 812 and custom menu formats 816. The logo graphics file 820 will store  
12 any necessary logos such as: Your Choice TV™ logos 824, Network logo files 828,  
13 cable system logo files 832, studio logo files 836, and graphic elements file 840. The  
14 menu display and cursor graphics file 850 will store menu display blocks 854 and  
15 cursor highlight overlays 858, as well as any other miscellaneous files needed to build  
16 the menus.

17 Using this method of storing menus discussed above, the menus can be  
18 changed by reprogramming the graphics memory 620 of the set top terminal 220. To  
19 revise the entire design of displayed menus, the network controller 214 or operations  
20 center 202 instructs the EEPROM 620 to be erased and reprogrammed with new  
21 menu templates. To change one menu format or logo, the network controller 214 or  
22 operations center 202 instructs just the one location in memory to be erased and  
23 rewritten. The menu reprogramming can also be done locally (at the set top terminal  
24 220) by a serviceman.

25 As shown in Figure 18a, each memory subfile is further divided into various  
26 memory blocks. For example, the background graphics file 800 contains the  
27 universal main menu backgrounds 804. The universal main menu backgrounds  
28 memory 804 includes memory units UM1 860, UM2 862 and UM3 863. Similarly,  
29 the logo graphics file 820 and menu display and cursor graphics file 850 contain  
30 individual subfile memory blocks (for example, studio logo file 836 has memory  
31 block SL1 864; menu display blocks 854 has memory menu display block MD1 866).

1           Figure 18b shows the hierarchical storage of text transmitted from the cable  
2 headend 208. Although text may be continuously transmitted with the video signals  
3 to set top terminals 220, text may also be transmitted intermittently. In such a case,  
4 the text is stored in the set top terminal 220. The text may be transmitted and stored  
5 in a compressed format using known techniques. Additionally, the text may be stored  
6 in the graphics memory 620 within the set top terminal 220.

7           Depending upon the use of the text, it will be stored in one of three portions  
8 of memory. Information sent with the text will either direct the text to a particular  
9 portion of memory, or include information as to the priority of text. The  
10 microprocessor 602, part of the set top terminal hardware represented at block 880,  
11 may then direct the text to the appropriate memory location for storage.

12           If the text is to be used frequently and over a long period of time a long term  
13 storage 875 will be used. If the text will be used for a shorter period of time (for  
14 example, a month), the text will be directed to an intermediate storage area 877. If  
15 the text is to be used almost immediately, or for a short period of time (for example,  
16 within a few days) the text is directed to a short term storage area 879. The  
17 microprocessor 602 locates the appropriate text required for a particular menu and  
18 retrieves it from the appropriate portion of memory 620. The text is output from the  
19 graphics memory 620 to the text generator 621. Text generated from the text  
20 generator 621 is thereafter directed to text/graphics video combiner 624.

21           Figure 18c shows the steps performed by the microprocessor 602 for creating  
22 a menu based upon a series of overlay screens. These instructions are stored in  
23 memory within the set top terminal 220 in a screen data file. The screens data file  
24 instructs the microprocessor 602 on the location of each graphics file on the screen.  
25 An example screen data file is shown in Table D, wherein the screen data file  
26 specifies menu data positioning in terms of, for example, x- and y-pixel positions,  
27 height and width, color codes and fonts. Alternatively, instructions or routines may  
28 be transmitted from the operations center 202 to be stored in memory within the  
29 individual set top terminals 220.

TABLE D

~ The following data lines are for the main menu											
~											
~		Screen Type		Template File		Description					
SCREEN		@MAIN		main menu.pcx		Main Menu					
~											
~		Justify	X	Y	Ht	Wd	FColor	BColor	Font		
STR POS	Left	165	85	30	300	27	55	FUTUR14.GFT			
STRING MAIN MENU											
~											
~		Justify	X	Y	Hght	Wdt					
PCX POS	LEFT	190	75	200	200						
PCX example.pcs											
~											
~		Justify	X	Y	Ht	Wd	FColor	BColor	Font		
		Ht								X	Y
										Wd	
ITEM POS	Left	120	100	20	400	15	25	FUTUR12.GFT	110		
		90	30							420	
ITEM @YCTV YOUR CHOICE TV											
~											
~		Justify	X	Y	Ht	Wd	FColor	BColor	Font		
		Ht								X	Y
										Wd	
ITEM POS	Left	120	200	20	400	15	25	FUTUR12.GFT	110		
		190	30							420	
ITEM @PPV PAY-PER-VIEW HIT MOVIES											

As shown at block 878 in Figure 18c, initially the microprocessor 602 instructs the tuner 603 to select a channel. The channel is decompressed, error corrected and decrypted, if necessary. If the video is to be reduced in size, so as to be placed within a video window, or is a split screen video window which must be enlarged, the video is scaled to the appropriate size. Additionally, the video may be required to be redirected to a portion of the television screen, accomplished by creating a series of offsets for each pixel location of the video.

Graphics may also be used to create a menu in most instances. As shown in block 882, the microprocessor 602 may fetch a background file, a logo file, and a menu display and cursor file in most instances. Each of these files is decompressed 883, and then combined, block 886.

Similarly, the microprocessor 602 may fetch text, as shown in block 884. Depending upon the memory location of the text, the microprocessor 602 will fetch the text from long-term, intermediate-term, or short-term storage, as described above.

1 Based upon this memory retrieval, the text is generated, block 885, and combined  
2 with the video (if any), with as many screens of a decompressed graphics as are  
3 necessary, and any text, block 886. The image or portions of the image are stored in  
4 the video combiner (for example, combiner 624 of Figure 19) until all overlays are  
5 received. Thereafter, the entire image is sent, under direction of another routine, to  
6 be displayed on the television screen, as represented by display block 888.

7 The terms and descriptions used herein are set forth by way of  
8 illustration only and are not meant as limitations. Those skilled in the art will  
9 recognize that numerous variations are possible within the spirit and scope of the  
10 invention as defined in the following claims.

**CLAIMS**

What is claimed is:

1. An apparatus that provides digital broadcast television programs to a subscriber, comprising;

a receiver module that receives program data and a local authorization code, wherein the authorization code allows the digital broadcast television programs to be decrypted for viewing;

a transmitter that sends a program selection to a remote site, wherein the program selection is made from the program data; and

a memory coupled to the receiver module, the memory storing the received authorization code until needed for decrypting the selected program, wherein when the program selection is received at the remote site, the remote site sends the local authorization code.

2. The apparatus of claim 1, further comprising a processor that processes the received local authorization code to decrypt the digital broadcast television programs, wherein the receiver module includes a first receiver and a second receiver.

3. The apparatus of claim 2, wherein the receiver module, the processor, the transmitter and the memory are contained in a set top terminal operably connected to a television, wherein the receiver module receives the digital broadcast television programs, and wherein when decrypted, the selected program is viewed on the television.

4. The apparatus of claim 3, wherein the television is an analog television, and wherein the set top terminal converts digital programs to analog programs for display on the analog television.

5. The apparatus of claim 2, wherein the first receiver, the transmitter, and the processor are contained on a smart card incorporated into a digital television.

6. The apparatus of claim 5, wherein the second receiver is incorporated into the digital television, wherein the second receiver receives the digital broadcast television programs, and wherein the digital television displays the selected broadcast television program.

1       7.           The apparatus of claim 2, wherein the receiver module, the processor,  
2       the transmitter, and the memory are contained on a smart card incorporated into a  
3       digital television, and wherein the digital television comprises a third receiver that  
4       receives the digital broadcast television programs.

5       8.           The apparatus of claim 7, wherein the digital television further  
6       comprises a demultiplexer that demultiplexes the received digital broadcast television  
7       programs.

8       9.           The apparatus of claim 2, wherein the first receiver, the processor and  
9       the transmitter are incorporated in a personal computer, and wherein the program data  
10      are displayed on a display of the personal computer.

11     10.          The apparatus of claim 9, wherein the second receiver and the memory  
12     are incorporated into a digital television, wherein the second receiver receives the  
13     digital television programs and the local authorization code, the digital television  
14     comprising a processor that processes the received local authorization code to decrypt  
15     the digital broadcast television programs.

16     11.          The apparatus of claim 9, wherein the personal computer comprises a  
17     connector that couples the personal computer to a digital television, the second  
18     receiver and the memory are incorporated into the digital television, the second  
19     receiver receives the digital broadcast television programs, and wherein the first  
20     receiver receives the local authorization code and the personal computer sends the  
21     local authorization code to the digital television, the digital television comprising a  
22     processor that processes the received local authorization code to decrypt the digital  
23     broadcast television programs.

24     12.          The apparatus of claim 11, wherein the connector is one of a radio  
25     frequency connector, an infra red connector and a wired connector.

26     13.          The apparatus of claim 12, wherein the wired connector comprises RS-  
27     232 connections and an RS-232 cable.

28     14.          The apparatus of claim 1, wherein the transmitter comprises one of a  
29     telephone modem, a cable modem, a wireless modem, an asymmetric digital  
30     subscriber line connector, an integrated services digital network connector, T1 and

1 T3 lines, a fiber optic connector, a local area net connector and a satellite antenna  
2 connector.

3 15. The apparatus of claim 1, further comprising a broadcast interface that  
4 receives the digital broadcast television programs, wherein the broadcast interface  
5 comprises one of a radio frequency connector, a telephone modem, a cable modem,  
6 a wireless modem, an asymmetric digital subscriber line connector, an integrated  
7 digital services network connector, T1 and T3 lines, a fiber optic connector, and a  
8 local area net connector and a satellite antenna connector.

9 16. The apparatus of claim 1, further comprising a demultiplexer, wherein  
10 the digital broadcast television programs are multiplexed with the local authorization  
11 code, and wherein the demultiplexer demultiplexes the local authorization code and  
12 the digital broadcast television programs.

13 17. The apparatus of claim 1, wherein the program data is program guide  
14 data, further comprising a remote control, wherein the remote control sends  
15 commands to scroll the program guide data and to select a desired program for  
16 viewing.

17 18. The apparatus of claim 17, wherein the remote control is one of a wired  
18 control, an infra red control, a radio frequency control, and a laser control.

19 19. The apparatus of claim 1, wherein the digital broadcast television  
20 programs are provided over a cable television network.

21 20. The apparatus of claim 1, wherein the digital broadcast television  
22 programs are provided via over-the-air broadcast.

23 21. The apparatus of claim 20, wherein the over-the-air broadcast is  
24 provided from a national broadcaster.

25 22. The apparatus of claim 20, wherein the over-the-air broadcast is  
26 provided from a broadcast affiliate.

27 23. The apparatus of claim 1, wherein the digital broadcast television  
28 programs are provided via satellite broadcast.

29 24. The apparatus of claim 1, wherein the remote site includes one of a local  
30 cable system, a broadcast affiliate and a national broadcaster.



1       25.       The apparatus of claim 24, wherein the transmitter sends the program  
2       selection to a local cable system, the local cable system returning the local  
3       authorization code.

4       26.       The apparatus of claim 25, wherein the local authorization code is  
5       multiplexed with the digital broadcast television programs.

6       27.       The apparatus of claim 24, wherein the transmitter sends the program  
7       selection to a broadcast affiliate, the broadcast affiliate returning the local  
8       authorization code.

9       28.       The apparatus of claim 27, wherein the local authorization code is  
10      multiplexed with the digital broadcast television programs.

11      29.       The apparatus of claim 24, wherein the transmitter sends the program  
12      selection to a national broadcaster, the national broadcaster returning the local  
13      authorization code.

14      30.       The apparatus of claim 29, wherein the local authorization code is  
15      multiplexed with the digital broadcast television programs.

16      31.       The apparatus of claim 24, wherein the remote site comprises an order  
17      and authorization system, the order and authorization system receiving the program  
18      selection and generating an authorization signal, the authorization signal providing  
19      the local authorization code.

20      32.       The apparatus of claim 31, wherein the order and authorization system  
21      is colocated with one of the local cable company, the broadcast affiliate and the  
22      national broadcaster.

23      33.       The apparatus of claim 31, wherein the order and authorization system  
24      includes a billing system, the billing system receiving the authorization request and  
25      generating a billing record.

26      34.       The apparatus of claim 33, wherein the billing record debits a  
27      subscriber's account.

28      35.       The apparatus of claim 33, wherein the billing system send the billing  
29      record to a subscriber for payment.

30      36.       The apparatus of claim 33, wherein the billing system charges a  
31      subscriber's credit card account.

1       37.       The apparatus of claim 1, wherein the remote site comprises a web page  
2       of an Internet, wherein the web page includes the program data and generates an  
3       authorization request.

4       38.       The apparatus of claim 37, wherein the remote site further comprises an  
5       order and authorization system coupled to the web page, the order and authorization  
6       system receiving the authorization request and generating an authorization signal, the  
7       authorization signal providing the local authorization code.

8       39.       The apparatus of claim 38, wherein the order and authorization system  
9       includes a billing system, the billing system receiving the authorization request and  
10      generating a billing record.

11      40.       The apparatus of claim 1, wherein the local authorization code,  
12      comprises:

13              an identification code; and

14              an address; and

15              one or more program identifiers, wherein the identification code  
16      uniquely identifies the apparatus receiving program access authorization, the address  
17      identifies the geographical location of the apparatus and routing instructions, and the  
18      one or more program identifiers specify the digital broadcast television programs that  
19      are authorized for viewing.

20      41.       The apparatus of claim 1, wherein the program selection comprises an  
21      event, the apparatus receiving authorization for a single display of the event.

22      42.       The apparatus of claim 1, wherein the program selection comprises an  
23      event, the apparatus receiving authorization for multiple displays of the event.

24      43.       The apparatus of claim 1, wherein the program selection comprises a  
25      subscription.

26      44.       The apparatus of claim 43, wherein the subscription is for a speciality  
27      channel.

28      45.       The apparatus of claim 44, wherein the speciality channel is a first-run  
29      movie channel.

30      46.       The apparatus of claim 44, wherein the speciality channel is a high  
31      definition television channel.

- 1        47.            The apparatus of claim 43, wherein the subscription is for a speciality  
2        program.
- 3        48.            The apparatus of claim 47, wherein the speciality program is a series of  
4        sporting events.
- 5        49.            The apparatus of claim 1, wherein the program data comprises a menu  
6        of available programs.
- 7        50.            The apparatus of claim 49, wherein the menu is a barker channel, the  
8        barker channel displaying programs and date/time of broadcast.
- 9        51.            The apparatus of claim 49, wherein the menu is a list of available  
10       programs.
- 11       52.            The apparatus of claim 49, wherein the menu includes program rating,  
12       year of production, and program biographical data.
- 13       53.            The apparatus of claim 52, wherein the biographical data includes a list  
14       of actors and a program summary.
- 15       54.            The apparatus of claim 49, wherein the menu includes a hypertext link  
16       to a web site on an Internet.
- 17       55.            The apparatus of claim 49, wherein the menu is displayed in a picture-  
18       in-picture format with a display of the program selection.
- 19       56.            The apparatus of claim 49, wherein the menu includes submenus.
- 20       57.            The apparatus of claim 56, wherein the submenus include a program  
21       selection confirmation submenu and a program description submenu.
- 22       58.            The apparatus of claim 49, wherein the menu includes overlay menus  
23       and hidden menus.
- 24       59.            The apparatus of claim 1, wherein the menu is displayed on a web page  
25       of an Internet, the web page including a home page and additional pages , the home  
26       page and the additional pages accessible by operation of forward, back and home  
27       buttons.
- 28       60.            The apparatus of claim 1, wherein the program selection includes a time  
29       out feature, the time out feature sending a cancel program order that deauthorizes  
30       display of the program selection and prevents a charge for the selected program.

1       61.       The apparatus of claim 60, wherein the time out feature is in effect prior  
2       to the display of the program selection, and for five minutes thereafter.

3       62.       The apparatus of claim 1, wherein the program data is provided in a  
4       hard-copy format, the hard copy format including event codes and program  
5       identifiers.

6       63.       The apparatus of claim 62, wherein the event codes and program  
7       identifiers are entered into the apparatus to send the program selection.

8       64.       The apparatus of claim 63, wherein the event codes and program  
9       identifiers are entered into the apparatus by operation of a remote control coupled to  
10      the apparatus.

11      65.       The apparatus of claim 63, wherein the event codes and program  
12      identifiers are entered into the apparatus by operation of a soft key board displayed  
13      on a television display, the television display coupled to the apparatus.

14      66.       The apparatus of claim 63, wherein the event codes and program  
15      identifiers are entered into the apparatus by operation of a key board coupled to a  
16      personal computer.

17      67.       An apparatus that provides digital broadcast television program  
18      ordering, comprising:

19              an order and authorization system that receives a program order for a  
20      terminal in a television distribution network and generates an authorization order that  
21      authorizes access to a program; and

22              a broadcaster coupled to the order and authorization system that sends  
23      the program to the terminal, wherein the program is multiplexed with other digital  
24      broadcast television programs, wherein the broadcaster receives the authorization  
25      signal, the authorization signal providing a local authorization code addressed to the  
26      terminal, the local authorization code allowing the terminal to demultiplex, decrypt  
27      and display the program.

28      68.       The apparatus of claim 67, wherein the local authorization signal is  
29      multiplexed with the digital broadcast television programs, and wherein the terminal  
30      demultiplexes the local authorization code to access the program.

- 1       69.       The apparatus of claim 67, wherein the local authorization code is  
2       transmitted by the order and authorization system to the terminal.
- 3       70.       The apparatus of claim 67, wherein the program is listed in a program  
4       guide.
- 5       71.       The apparatus of claim 70, wherein the program guide is an electronic  
6       program guide.
- 7       72.       The apparatus of claim 71, wherein the electronic program guide is  
8       provided on a web page on an Internet, and wherein the terminal accesses the web  
9       page to receive the electronic program guide.
- 10      73.       The apparatus of claim 71, wherein the electronic program guide is  
11      broadcast to the terminal by the broadcaster.
- 12      74.       The apparatus of claim 71, wherein the electronic program guide is in  
13      a format of a barker channel showing program selections and time/date of broadcast.
- 14      75.       The apparatus of claim 71, wherein the electronic program guide is a list  
15      of available programs, the list capable of being scrolled to show all available  
16      programs.
- 17      76.       The apparatus of claim 67, wherein the program is one of a single event,  
18      a multiple event and a subscription.
- 19      77.       The apparatus of claim 76, wherein the local authorization code provides  
20      access to the single event on multiple occasions.
- 21      78.       The apparatus of claim 76, wherein the subscription includes a speciality  
22      channel subscription and a speciality program subscription.
- 23      79.       The apparatus of claim 78, wherein the speciality channel subscription  
24      includes monthly and annual subscriptions.
- 25      80.       The apparatus of claim 78, wherein the speciality channel subscription  
26      is a first-run movie channel subscription.
- 27      81.       The apparatus of claim 78, wherein the speciality program subscription  
28      is a sporting event subscription.
- 29      82.       The apparatus of claim 78, wherein the sporting event subscription  
30      includes a full season subscription and a partial season subscription.

1       83.       The apparatus of claim 81, wherein the sporting event subscription  
2 includes a favorite team subscription.

3       84.       The apparatus of claim 67, further comprising a billing system coupled  
4 to the order and authorization system, the billing system receiving the program order  
5 and generating a billing record.

6       85.       The apparatus of claim 84, wherein the billing record is used to debit a  
7 cash card included in the terminal, the billing system sending a debit signal  
8 corresponding to the billing record to the terminal.

9       86.       The apparatus of claim 67, wherein the order and authorization system  
10 includes a time out feature that allows cancellation of the program order without  
11 incurring a charge, the time out feature effective for a time prior to a start of the  
12 program and for a time after the start of the program.

13       87.       The apparatus of claim 86, wherein the time after start of the program  
14 is five minutes.

15       88.       The apparatus of claim 67, wherein the broadcaster is a national  
16 broadcaster.

17       89.       The apparatus of claim 67, wherein the broadcaster is a broadcast  
18 affiliate.

19       90.       The apparatus of claim 67, wherein the broadcaster is a local cable  
20 company.

21       91.       The apparatus of claim 67, wherein the broadcaster is a digital satellite  
22 broadcaster.

23       92.       The apparatus of claim 67, wherein the digital broadcast television  
24 programs are provided over-the-air.

25       93.       The apparatus of claim 67, wherein the digital broadcast television  
26 programs are provided over a cable television system.

27       94.       The apparatus of claim 67, wherein the digital broadcast television  
28 programs are provided over a satellite system.

29       95.       The apparatus of claim 67, wherein the order and authorization system  
30 and the broadcaster are colocated.

1       96.       The apparatus of claim 67, wherein the order and authorization system  
2       and the broadcaster are colocated with a billing system.

3       97.       The apparatus of claim 67, wherein the local authorization code includes  
4       a terminal address, a routing indicator, and a terminal identifier.

5       98.       The apparatus of claim 97, wherein the local authorization code further  
6       includes an event identifier and a program identifier, the event identifier indicating  
7       a time and date of broadcast, the program identifier uniquely identifying the program.

8       99.       A method for providing broadcast television digital programming,  
9       comprising:

10               generating program data related to the digital programming;  
11               providing the program data;  
12               displaying the program data as a program menu;  
13               receiving a program order, the program order designating one or more  
14       programs for viewing;  
15               sending a program authorization; and  
16               broadcasting the digital programming, wherein the program  
17       authorization provides access to the one or more programs designated by the program  
18       order.

19       100.       The method of claim 99, wherein the digital programming and the  
20       programming data are broadcast over-the-air.

21       101.       The method of claim 99, wherein the digital programming and the  
22       program data are broadcast over a cable television system.

23       102.       The method of claim 99, wherein the digital programming is broadcast  
24       over-the-air and the program data is provided on an Internet web site.

25       103.       The method of claim 99, wherein the digital programming is broadcast  
26       over a cable television system and the program data is provided on an Internet web  
27       page.

28       104.       The method of claim 99, wherein the program order is received at a  
29       remote location.

30       105.       The method of claim 104, wherein the remote location is an order and  
31       authorization system.

1       106.       The method of claim 104, wherein the remote location is an Internet web  
2       page.

3       107.       The method of claim 104, wherein the remote location is a digital  
4       program broadcaster.

5       108.       The method of claim 107, wherein the digital program broadcaster is one  
6       of a national broadcaster, a broadcast affiliate, a satellite broadcaster and a cable  
7       broadcaster.

8       109.       The method of claim 108, wherein the digital program broadcaster is co-  
9       located with an order and authorization system.

10      110.       The method of claim 99, wherein the program data is provided to a  
11      terminal in a digital broadcast television environment.

12      111.       The method of claim 99, further comprising sending the program  
13      authorization from a remote location to a digital programming broadcaster.

14      112.       The method of claim 111, wherein the remote location is an Internet web  
15      page.

16      113.       The method of claim 99, wherein the program authorization includes a  
17      local authorization code addressed to a terminal in a digital broadcast television  
18      environment, and wherein the sending step comprises multiplexing the program  
19      authorization with the digital programming.

20      114.       The method of claim 99, wherein the program authorization includes a  
21      local authorization code addressed to a terminal in a digital broadcast television  
22      environment, and wherein the sending step comprises sending the local authorization  
23      code to a terminal in a digital broadcast television environment.

24      115.       The method of claim 99, further comprising:  
25                    waiting for a time out period to determine if a cancel order signal has  
26      been received, and if the cancel order signal is not received in the time out period:  
27                    sending the program order to a billing system, and  
28                    preparing a billing record.

29      116.       The method of claim 99, further comprising:  
30                    waiting for a time out period to determine if a cancel order signal has  
31      been received, and if the cancel order signal is received in the time out period:



1                   generating a deauthorization signal; and  
2                   transmitting the deauthorization signal, wherein the  
3                   deauthorization signal removes access to a previously authorized program.

4           117.       The method of claim 99, wherein the one or more programs include one  
5                   of a single event, a multiple event and a subscription.

6           118.       The method of claim 117, wherein the local authorization code provides  
7                   access to the single event on multiple occasions.

8           119.       The method of claim 117, wherein the subscription includes a speciality  
9                   channel subscription and a speciality program subscription.

10          120.       The method of claim 119, wherein the speciality channel subscription  
11                   includes monthly and annual subscriptions.

12          121.       The method of claim 119, wherein the speciality channel subscription  
13                   is a first-run movie channel subscription.

14          122.       The method of claim 119, wherein the speciality program subscription  
15                   is a sporting event subscription.

16          123.       The method of claim 119, wherein the sporting event subscription  
17                   includes a full season subscription and a partial season subscription.

18          124.       The method of claim 123, wherein the sporting event subscription  
19                   includes a favorite team subscription.

20          125.       The method of claim 99, wherein the order and authorization system  
21                   includes a billing system, the billing system receiving the program order and  
22                   generating a billing record.

23          126.       The method of claim 125, further comprising sending a debit signal  
24                   corresponding to the billing record to a terminal, the debit signal debiting a cash card  
25                   in the terminal.

26          127.       A method for providing digital broadcast programming to a terminal in  
27                   a television network, comprising:

28                   receiving a program order from the terminal;

29                   generating an authorization signal;

30                   sending the authorization signal to the terminal;

1               broadcasting the program, wherein the program is multiplexed with  
2 other digital programs and wherein the authorization signal received by the terminal  
3 provides a code that the terminal uses to decrypt the program.

4       128.       The method of claim 127, wherein the authorization signal is  
5 multiplexed with the other digital programs, the terminal demultiplexing the  
6 authorization signal and the digital programs.

7       129.       The method of claim 127, wherein a remote site transmits the  
8 authorization signal and a broadcaster broadcasts the multiplexed digital programs.

9       130.       The method of claim 129, wherein the remote site is an order and  
10 authorization system.

11       131.       The method of claim 130, wherein the order and authorization system  
12 is colocated with the broadcaster.

13       132.       The method of claim 131, wherein the remote site is an Internet web site.

14       133.       The method of claim 129, wherein the broadcaster is one of a national  
15 broadcaster, a broadcast affiliate, a satellite broadcaster and a cable broadcaster.

16       134.       The method of claim 127, wherein the multiplexed digital programs are  
17 broadcast over-the-air.

18       135.       The method of claim 127, wherein the multiplexed digital programs are  
19 broadcast over a cable television cable.

20       136.       The method of claim 127, wherein the multiplexed digital programs are  
21 broadcast over a satellite system.

22       137.       The method of claim 127, further comprising:

23               generating a program guide; and

24               transmitting the program guide, wherein program selections are made  
25 based on the program guide.

26       138.       The method of claim 137, wherein the program guide is broadcast to the  
27 terminal.

28       139.       The method of claim 137, wherein the program guide is provided at an  
29 Internet web site.

30       140.       The method of claim 127, wherein the digital programs include high  
31 definition television programs and standard definition television programs.

- 1       141.       The method of claim 127, further comprising:  
2               generating a billing record corresponding to the program order; and  
3               charging an account of a subscriber who initiated the program order.
- 4       142.       A method for providing digital broadcast programming to a first  
5       terminal in a television network, comprising:  
6               receiving a program order from a second terminal;  
7               generating an authorization code;  
8               sending the authorization code to the first terminal;  
9               broadcasting the program, wherein the program is multiplexed with  
10       other digital programs and wherein the authorization code received by the first  
11       terminal provides a code that the first terminal uses to decrypt the program.
- 12       143.       The method of claim 142, wherein the authorization code is multiplexed  
13       with the other digital programs, the first terminal demultiplexing the authorization  
14       signal and the digital programs.
- 15       144.       The method of claim 142, wherein a remote site transmits the  
16       authorization code and a broadcaster broadcasts the multiplexed digital programs.
- 17       145.       The method of claim 144, wherein the remote site is an order and  
18       authorization system.
- 19       146.       The method of claim 145, wherein the order and authorization system  
20       is a network controller.
- 21       147.       The method of claim 145, wherein the order and authorization system  
22       is collocated with the broadcaster.
- 23       148.       The method of claim 145, wherein the remote site is an Internet web site.
- 24       149.       The method of claim 144, wherein the broadcaster is one of a national  
25       broadcaster, a broadcast affiliate, a satellite broadcaster and a cable broadcaster.
- 26       150.       The method of claim 144, wherein the remote site gathers programs  
27       watched information.
- 28       151.       A method for providing multiple digital broadcast programs to a  
29       terminal in a television network, comprising:  
30               receiving a program order, wherein the program order requests access  
31       to more than one program being broadcast simultaneously;

1                   generating an authorization signal;  
2                   sending the authorization signal to the terminal;  
3                   broadcasting the programs, wherein the programs are multiplexed with  
4 other digital programs and wherein the authorization signal received by the terminal  
5 provides a code that the terminal uses to decrypt the more than one programs.

6       152.       The method of claim 151, wherein the authorization signal is  
7 multiplexed with the other digital programs, the terminal demultiplexing the  
8 authorization signal and the more than one programs authorized for viewing by the  
9 authorization code.

10      153.       The method of claim 151, wherein a remote site transmits the  
11 authorization signal and a broadcaster broadcasts the multiplexed digital programs.

12      154.       The method of claim 153, wherein the remote site is an order and  
13 authorization system.

14      155.       The method of claim 154, wherein the order and authorization system  
15 is collocated with the broadcaster.

16      156.       The method of claim 155, wherein the remote site is an Internet web site.

17      157.       The method of claim 153, wherein the broadcaster is one of a national  
18 broadcaster, a broadcast affiliate, a satellite broadcaster and a cable broadcaster.

19      158.       The method of claim 157, further comprising:  
20                   gathering subscriber specific data for a subscriber;  
21                   generating subscriber specific menu data, based on the subscriber  
22 specific data; and  
23                   providing a subscriber specific menu, based on the subscriber specific  
24 menu data, for viewing.

25      159.       The method of claim 158, wherein the subscriber specific data includes  
26 one of programs watched data, demographic data and subscriber queries.

27      160.       The method of claim 159, wherein the terminal gathers the programs  
28 watched data, based on programs played on the terminal.

29      161.       The method of claim 159, wherein the terminal transmits the gathered  
30 programs watched data to a remote location.

1       162.       The method of claim 161, wherein the location is one of a national  
2 broadcaster, a broadcast affiliate, and a local cable system.

3       163.       The method of claim 162, wherein the terminal transmits the gathered  
4 programs watched data via one of an asymmetric digital subscriber line, an integrated  
5 digital services network line, T1 and T3 lines, a cable modem, a telephone modem,  
6 a wireless modem, a local area network, and a fiber optic cable.

7       164.       The method of claim 158, wherein the programs watched data is  
8 gathered by one of the national broadcaster, the broadcast affiliate and the local cable  
9 system.

10      165.       The method of claim 158, wherein the subscriber specific menu is  
11 provided at an Internet web site.

12      166.       The method of claim 165, wherein the specific subscriber is identified  
13 by one of an ANI, a cookie, an Internet address, a user name and a user identification.

14      167.       The method of claim 158, wherein the subscriber specific menu is  
15 provided with a multiplexed program signal.

16      168.       The method of claim 158, wherein the subscriber specific menu is  
17 provided out of band.

18      169.       A system that provides digital broadcast television program ordering,  
19 comprising:

20               a processor that receives a program order for a terminal in a television  
21 distribution network and generates an authorization order that authorizes access to  
22 a program; and

23               a broadcaster coupled to the processor that receives the authorization  
24 signal and sends the program to the terminal, wherein the program is multiplexed  
25 with other digital broadcast television programs, and wherein the authorization signal  
26 provides a local authorization code addressed to the terminal, the local authorization  
27 code allowing the terminal to demultiplex, decrypt and display the program.

28      170.       The system of claim 169, wherein the local authorization code is  
29 multiplexed with the digital broadcast television programs, and wherein the terminal  
30 demultiplexes the local authorization code to access the program.

- 1       171.       The system of claim 169, wherein the local authorization code is  
2       transmitted by the processor to the terminal.
- 3       172.       The system of claim 169, wherein the program is listed in a program  
4       guide.
- 5       173.       The system of claim 172, wherein the program guide is an electronic  
6       program guide.
- 7       174.       The system of claim 173, wherein the electronic program guide is  
8       provided on a web page on an Internet, and wherein the terminal accesses the web  
9       page to receive the electronic program guide.
- 10      175.       The system of claim 173, wherein the electronic program guide is  
11      broadcast to the terminal by the broadcaster.
- 12      176.       The system of claim 173, wherein the electronic program guide is in a  
13      format of a barker channel showing program selections and time/date of broadcast.
- 14      177.       The system of claim 173, wherein the electronic program guide is a list  
15      of available programs, the list capable of being scrolled to show available programs.
- 16      178.       The system of claim 169, wherein the program is listed in a menu.
- 17      179.       The system of claim 169, wherein the processor gathers subscriber  
18      specific data for a subscriber, generates subscriber specific menu data, based on the  
19      subscriber specific data and provides a subscriber specific menu, based on the  
20      subscriber specific menu data, for viewing.
- 21      180.       The system of claim 179, wherein the subscriber specific data includes  
22      one of programs watched data, demographic data and subscriber queries.
- 23      181.       The system of claim 180, wherein the programs watched data is based  
24      on programs played on the terminal.
- 25      182.       The system of claim 180, wherein the programs watched data is based  
26      on program orders received at the processor.
- 27      183.       The system of claim 179, wherein the subscriber specific menu is  
28      provided at an Internet web site.
- 29      184.       The system of claim 183, wherein the specific subscriber is identified  
30      by one of an ANI, a cookie, a user identification, a user name, and an Internet  
31      address.

1       185.       The system of claim 179, wherein the subscriber specific menu is  
2       provided with a multiplexed program signal.

3       186.       The system of claim 179, wherein the subscriber specific menu is  
4       provided out of band.

5       187.       The system of claim 169, wherein the terminal gathers subscriber  
6       specific data for a subscriber.

7       188.       The system of claim 187, wherein the subscriber specific data includes  
8       one of programs watched data and subscriber queries.

9       189.       The system of claim 188, wherein the subscriber specific data is  
10      provided to a remote location.

11      190.       The system of claim 189, wherein the remote location includes the  
12      processor.

13      191.       The system of claim 190, wherein the remote location is one of a  
14      national broadcaster, a broadcast affiliate, and a local cable system.

15      192.       The system of claim 190, wherein the processor generates subscriber  
16      specific menu data, based on the subscriber specific data, and provides a subscriber  
17      specific menu, based on the subscriber specific menu data, for viewing.

18      193.       The system of claim 189, wherein the subscriber specific menu is  
19      provided at an Internet web site.

20      194.       The system of claim 193, wherein the specific subscriber is identified  
21      by one of an ANI, a cookie, an Internet address, a user name, and a user  
22      identification.

23      195.       The system of claim 193, wherein the specific subscriber is identified  
24      by subscriber-provided data.

25      196.       The system of claim 189, wherein the subscriber specific menu is  
26      provided with a multiplexed program signal.

27      197.       The system of claim 189, wherein the subscriber specific menu is  
28      provided out of band.

29      198.       The system of claim 187, wherein the terminal transmits the gathered  
30      subscriber specific data via one of an asymmetric digital subscriber line, an integrated  
31      digital services network line, T1 and T3 lines, a cable modem, a telephone modem,  
32      a wireless modem, a local area network, and a fiber optic cable.

1/31

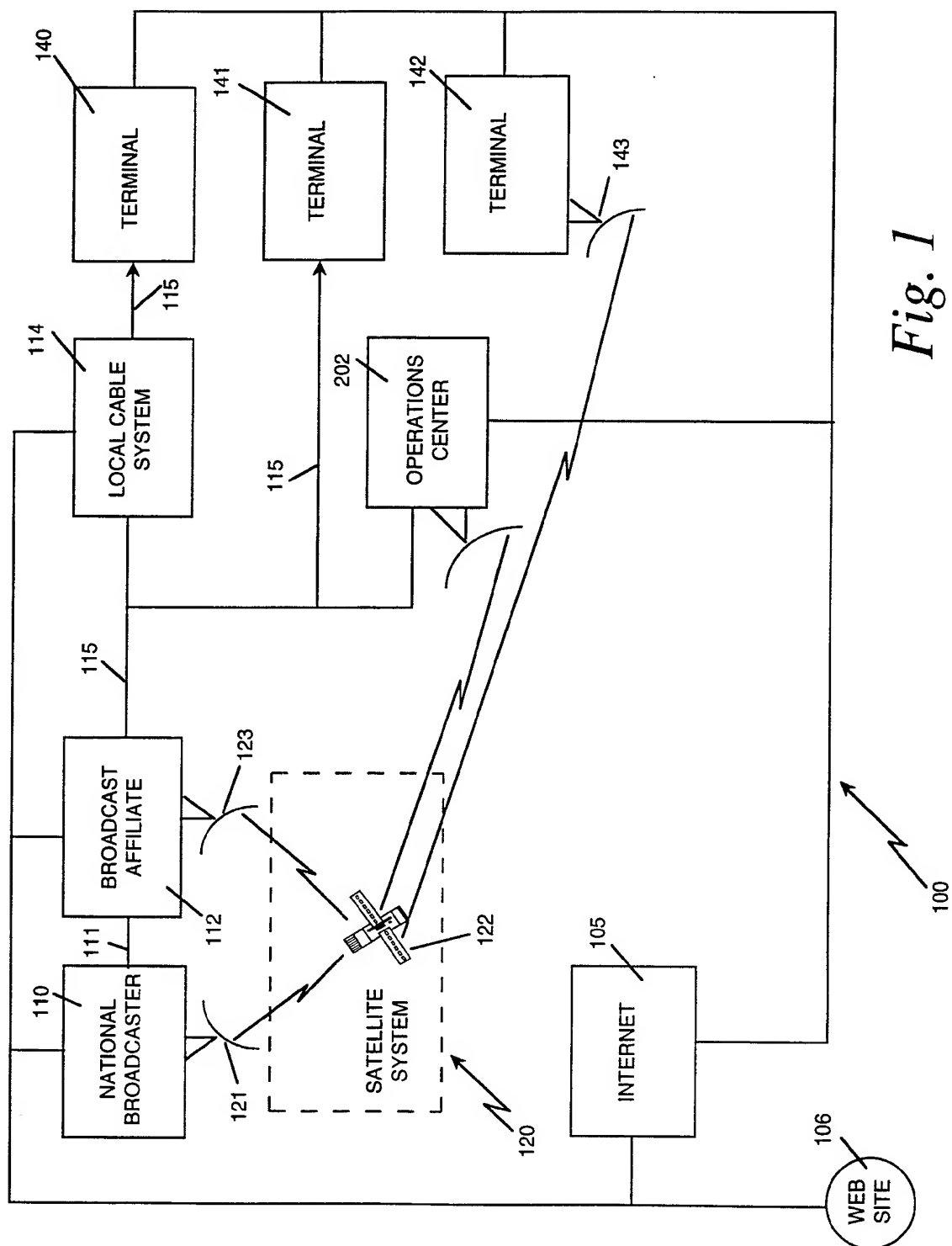


Fig. 1



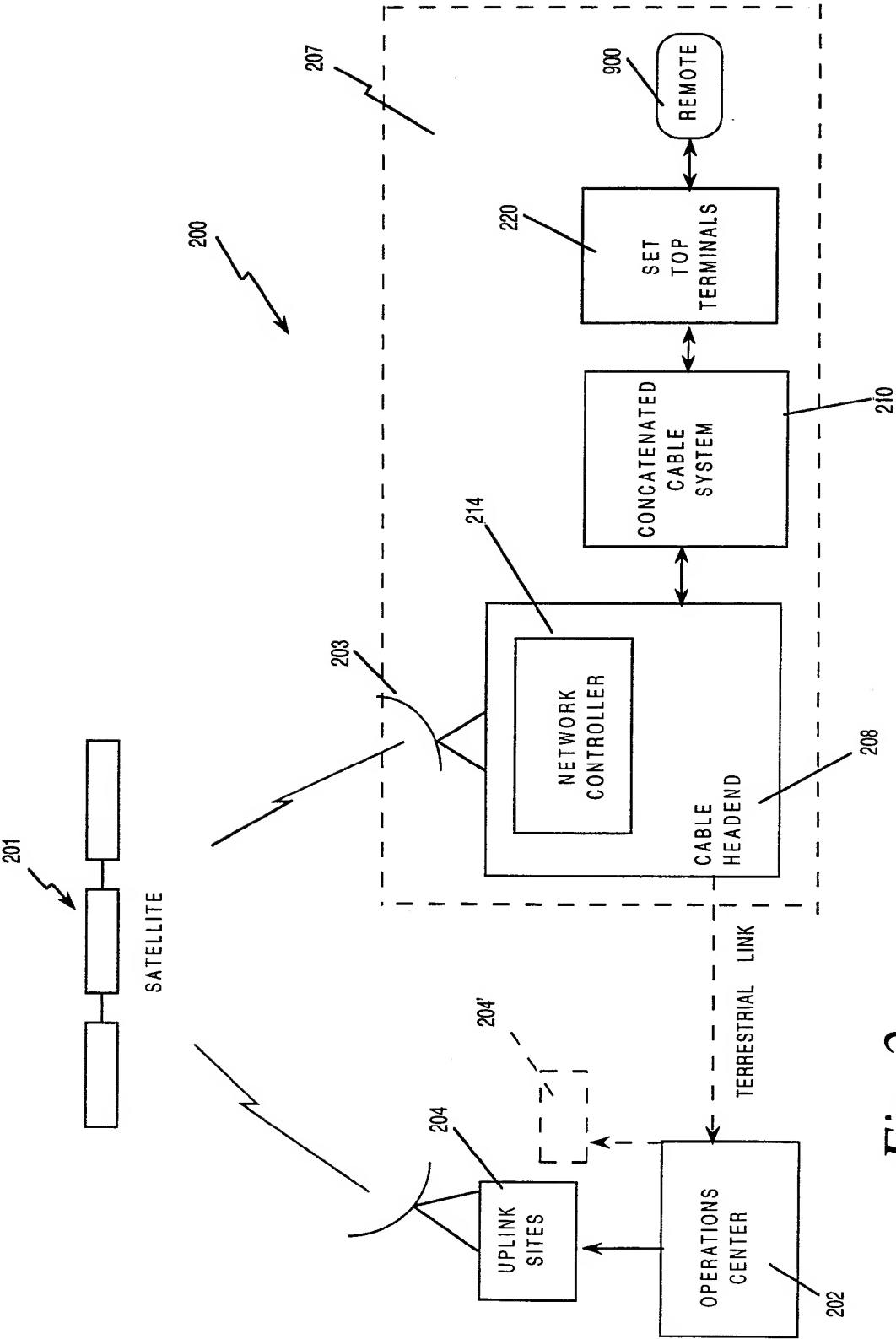


Fig. 2

3/31

140


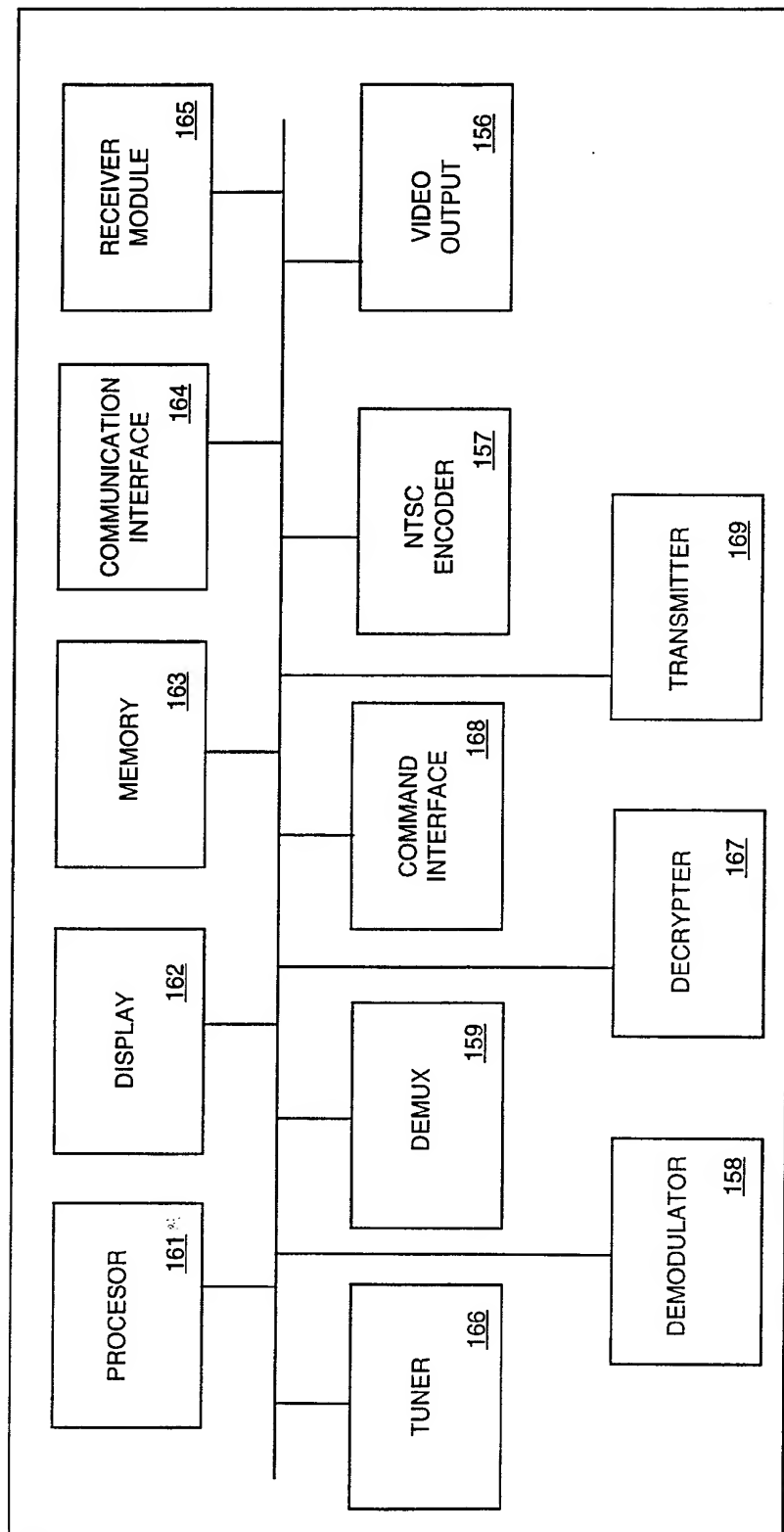



Fig. 3

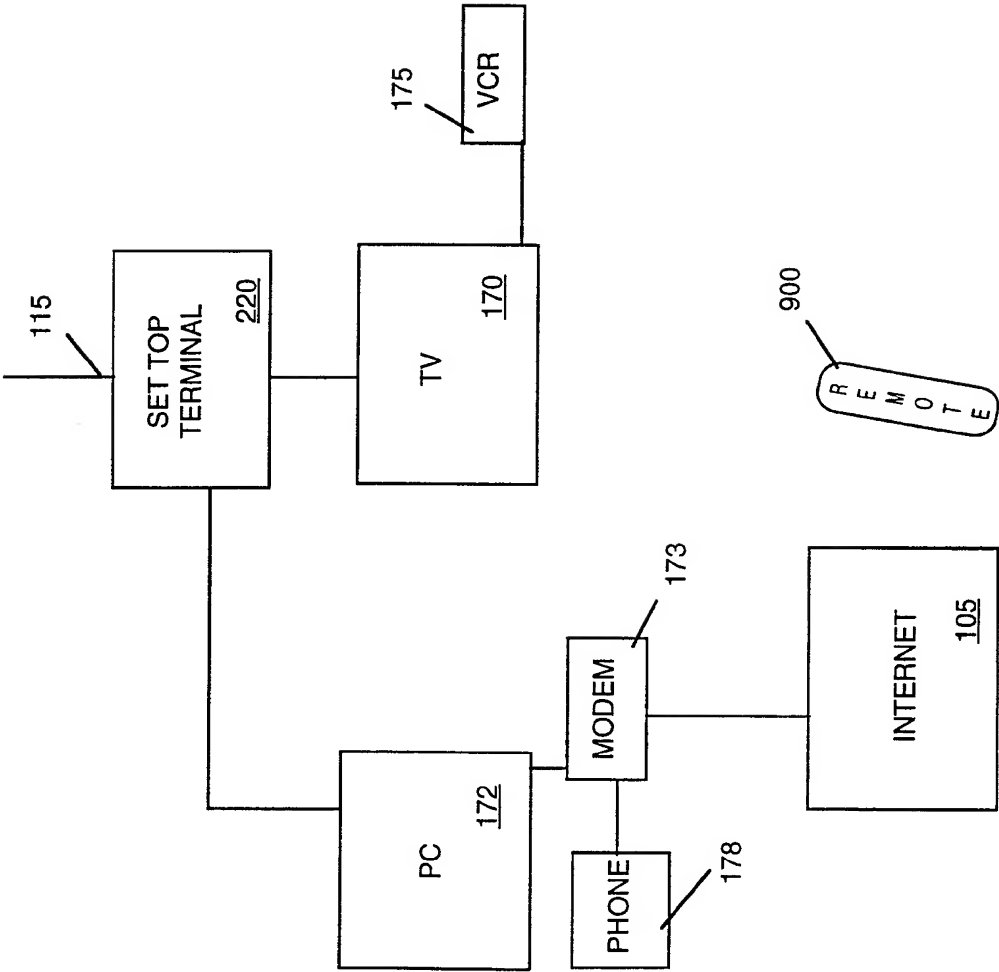


Fig. 4a

5/31

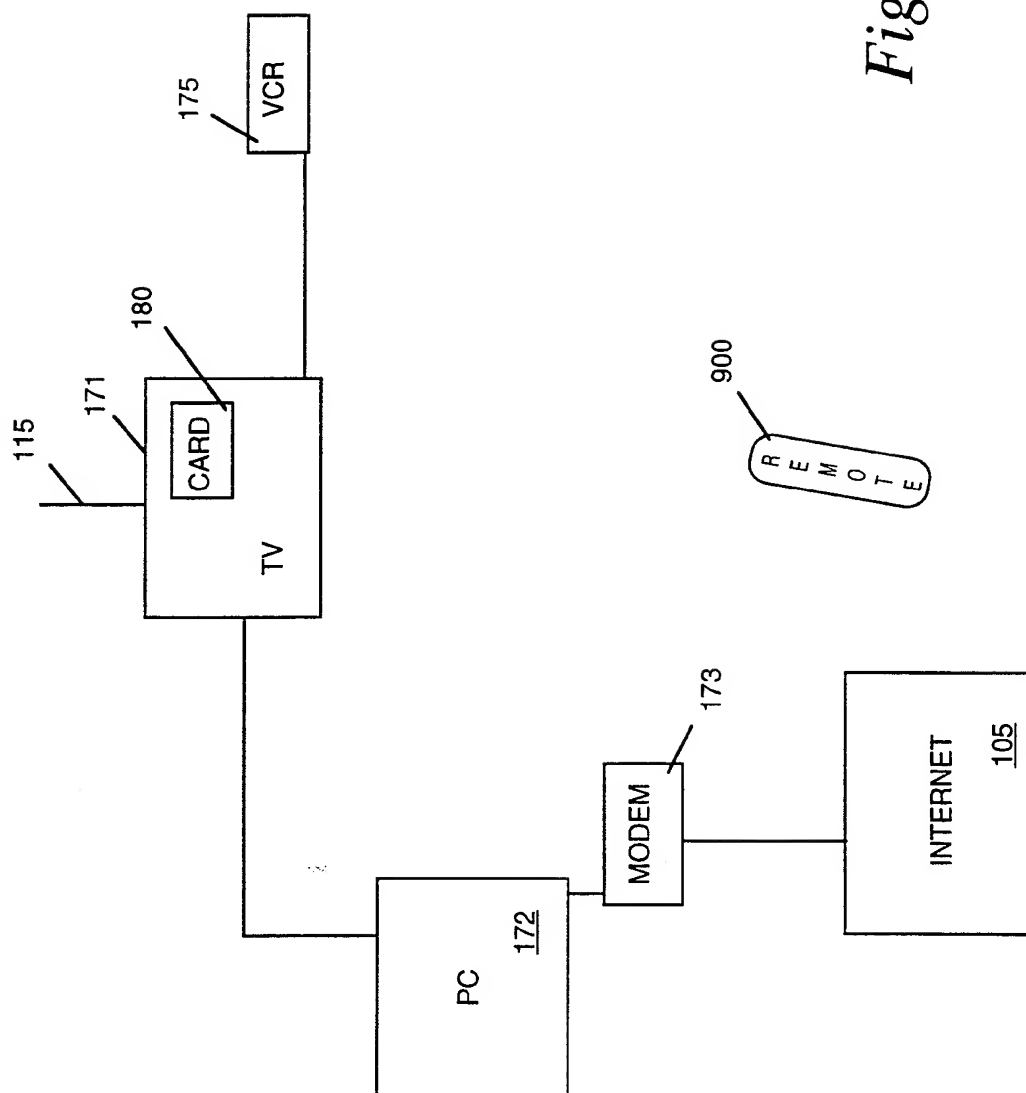


Fig. 4b

6/31

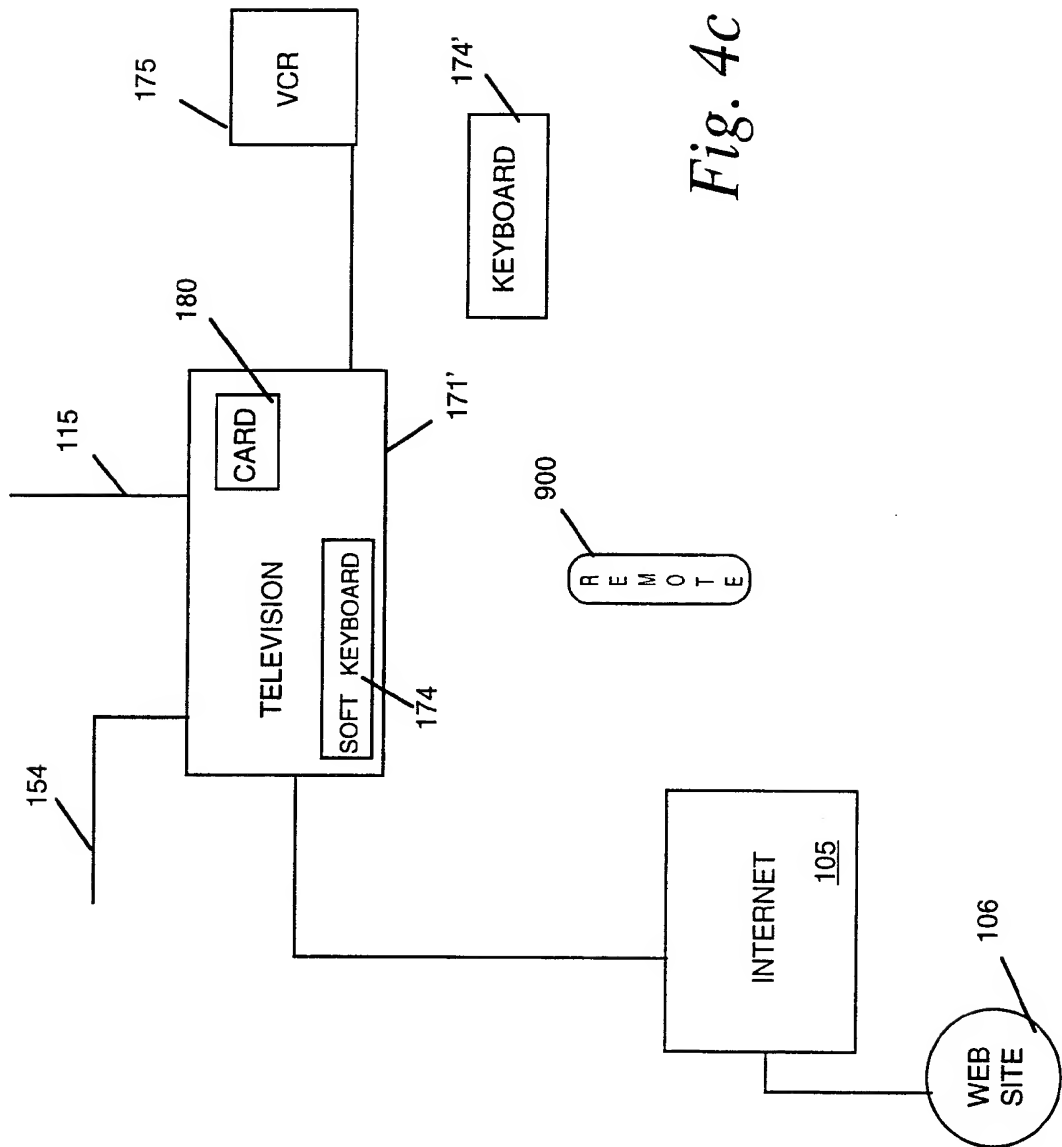
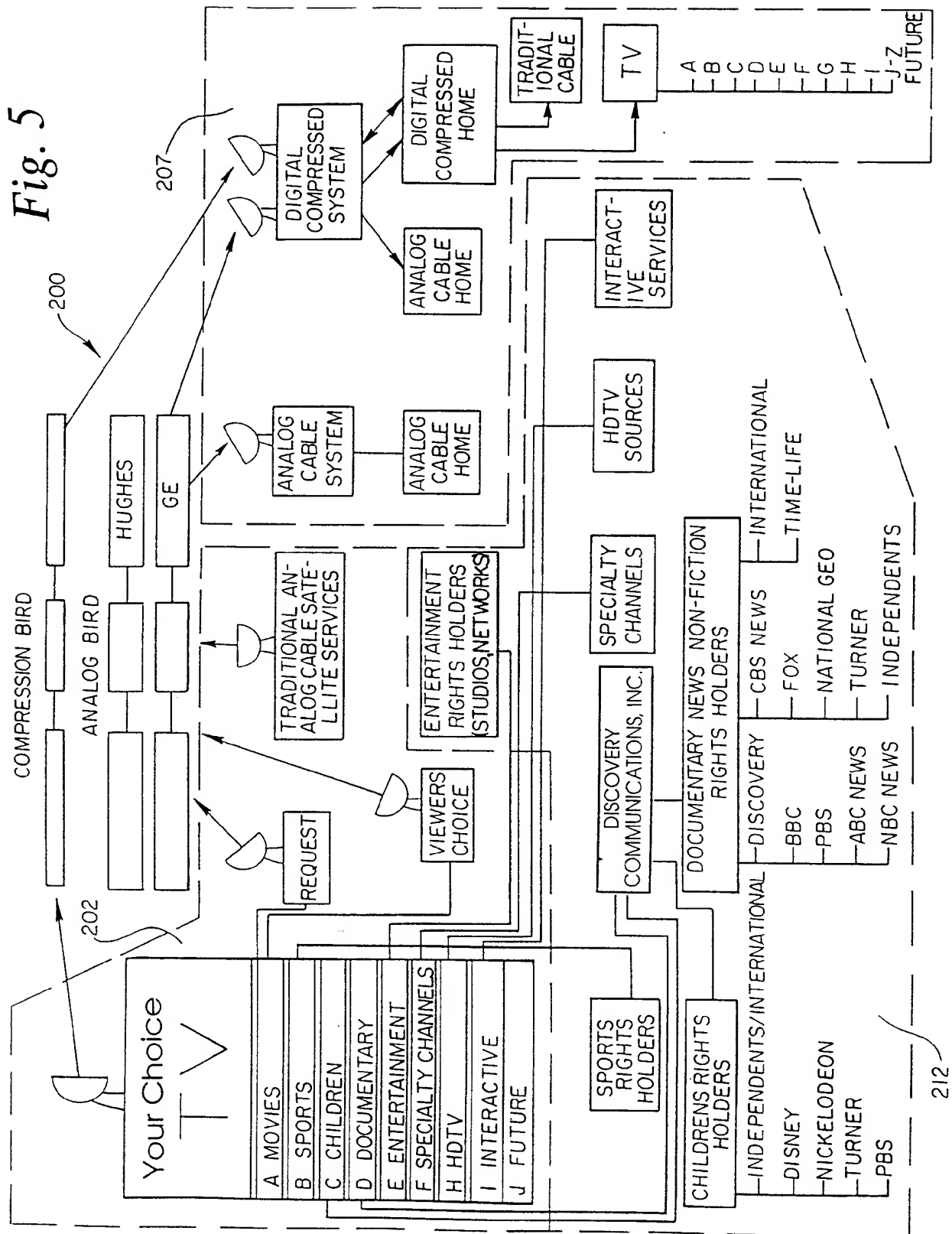


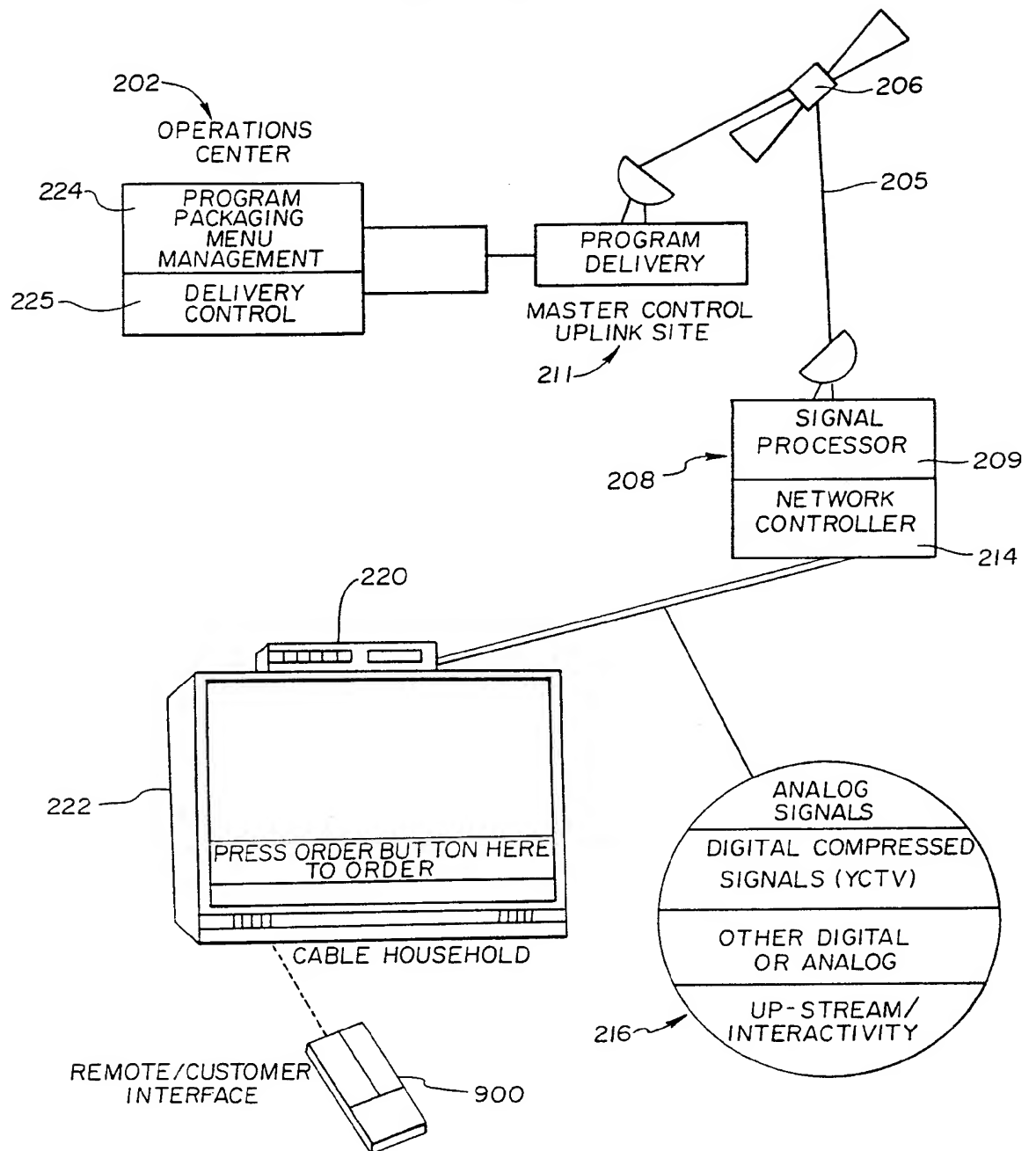
Fig. 4c

7/31

Fig. 5

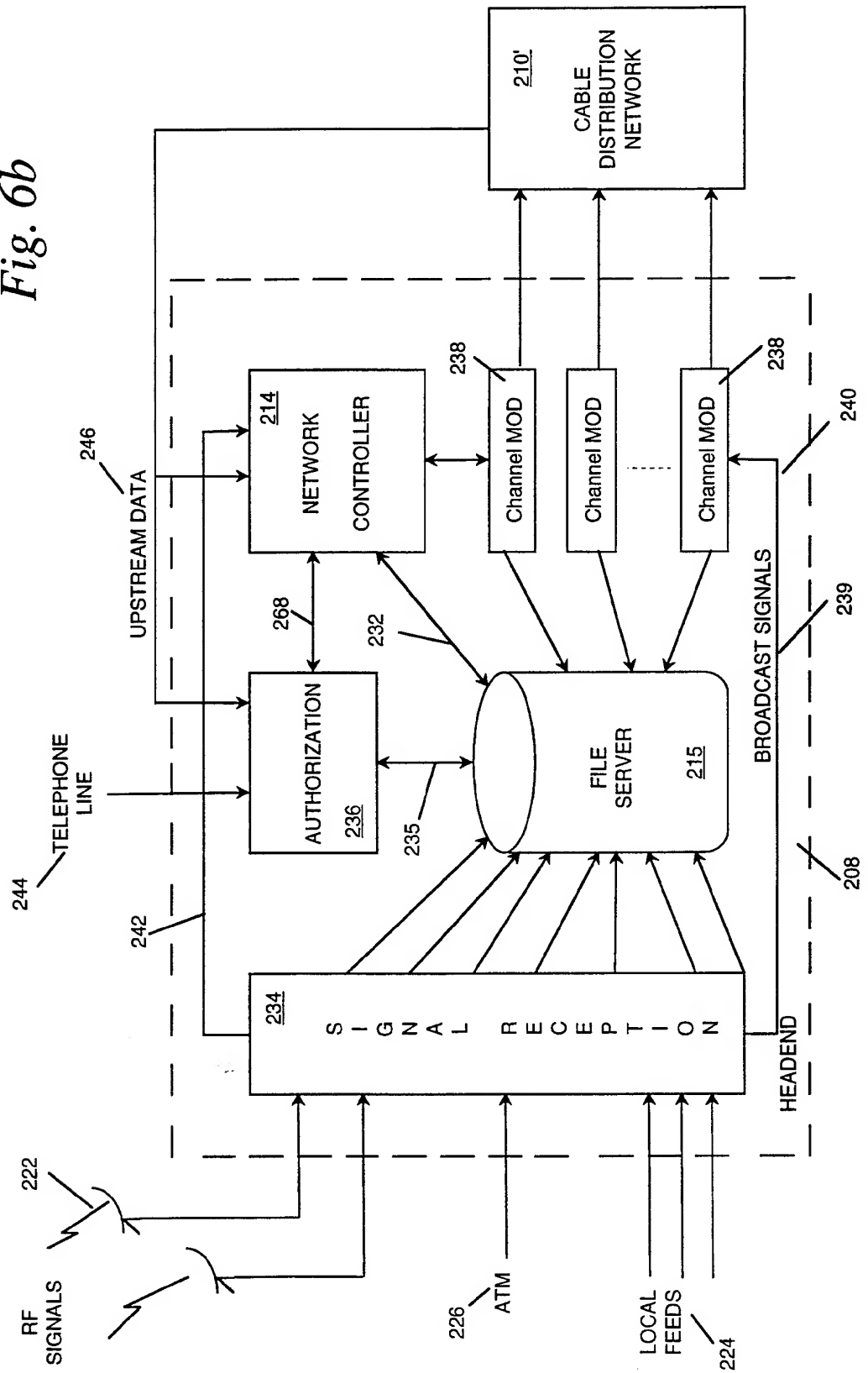


8/31

*Fig. 6a*

9/31

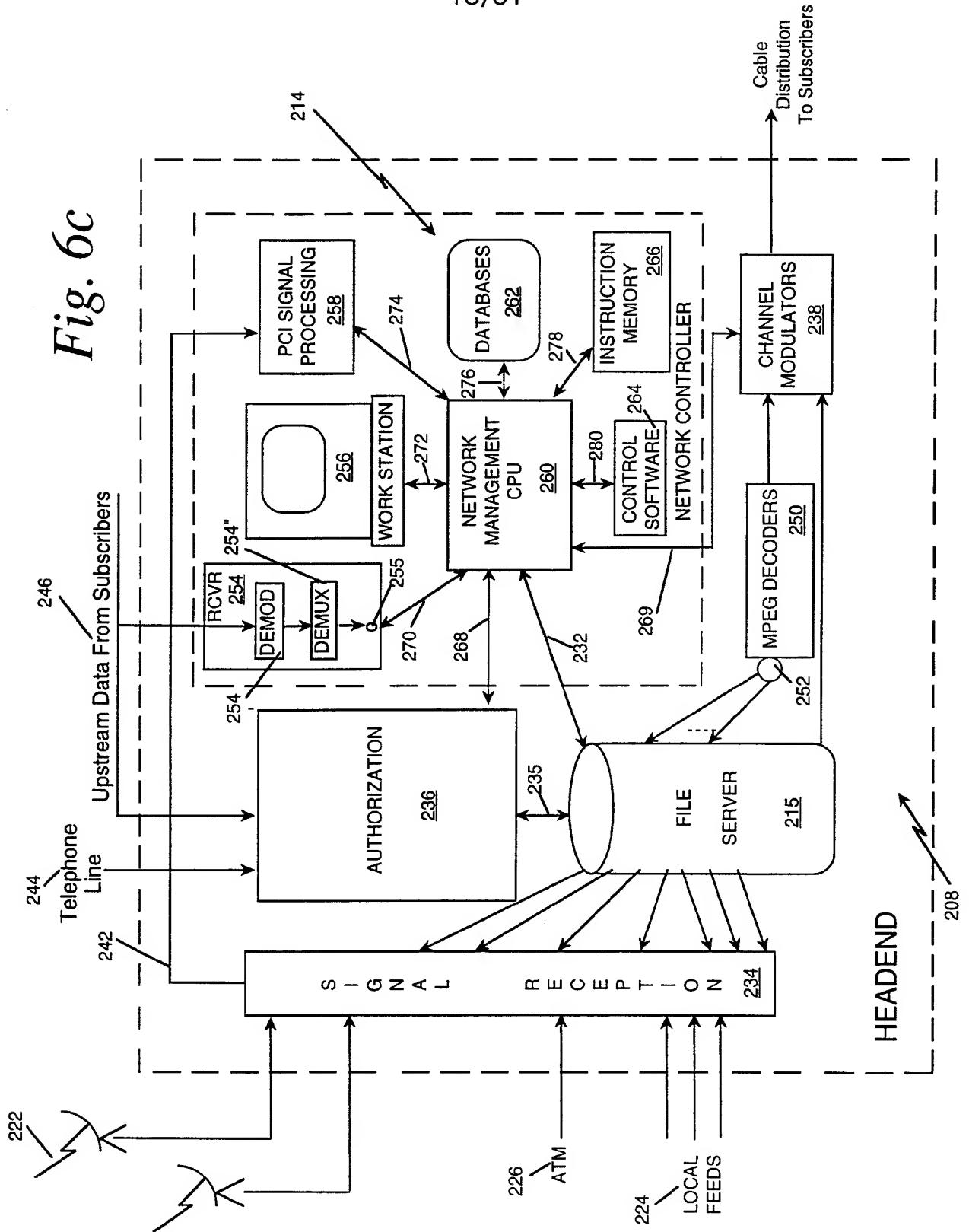
Fig. 6b





10/31

Fig. 6c



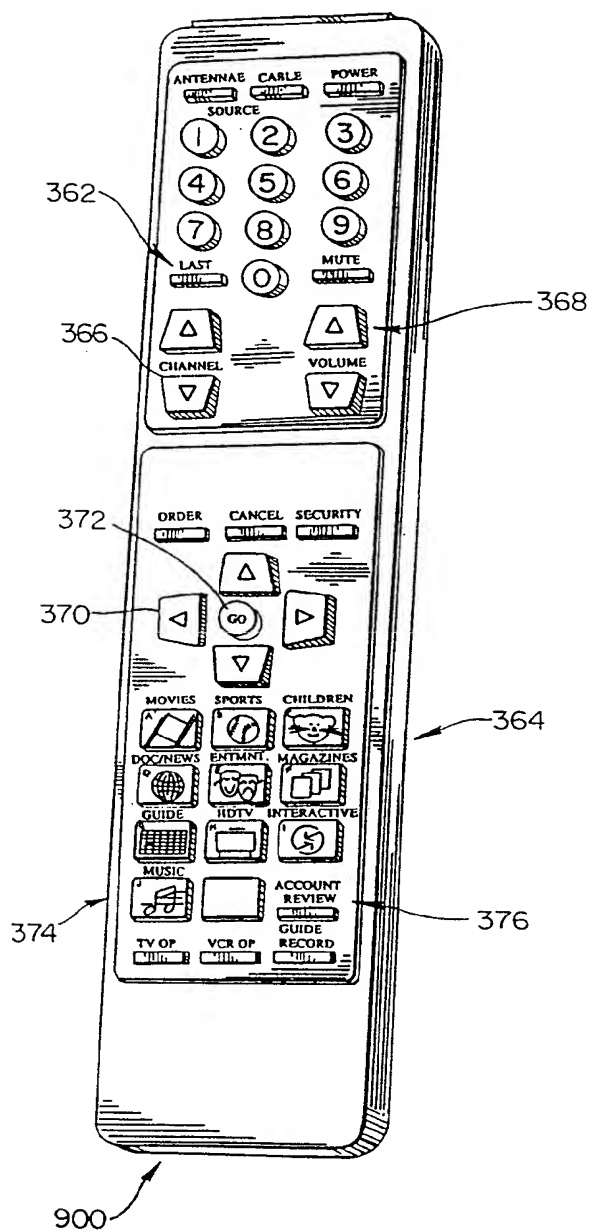
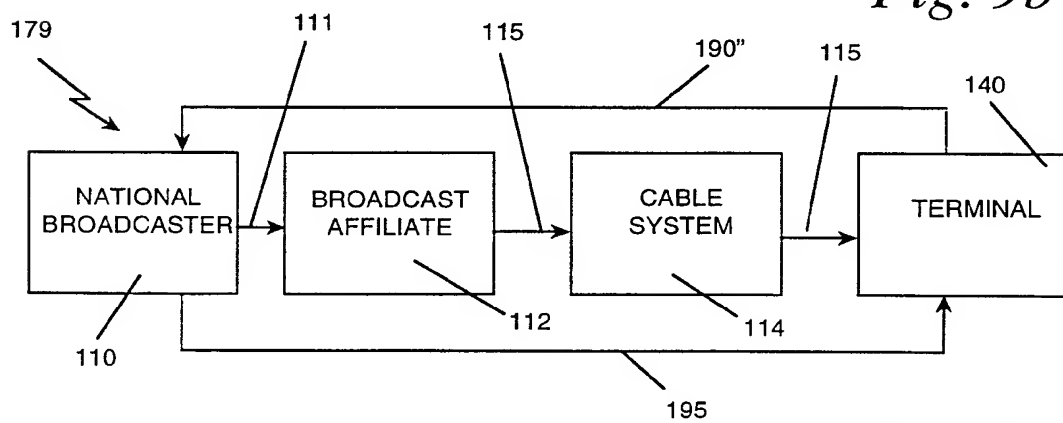
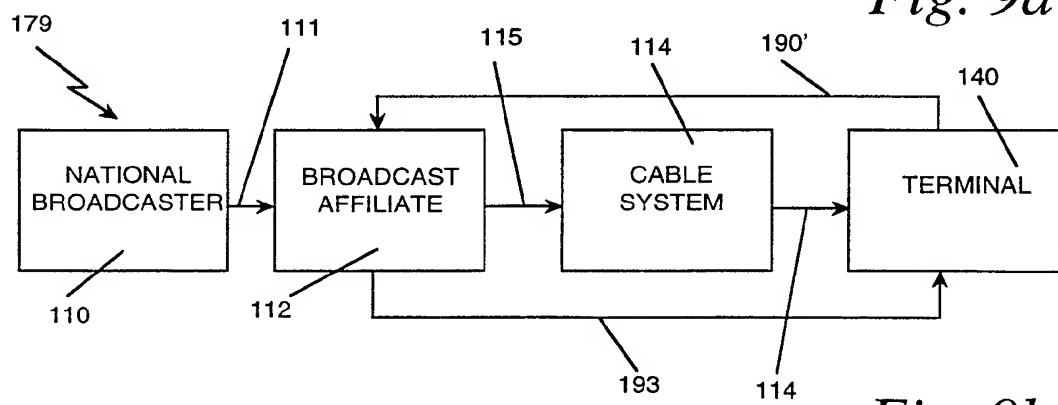
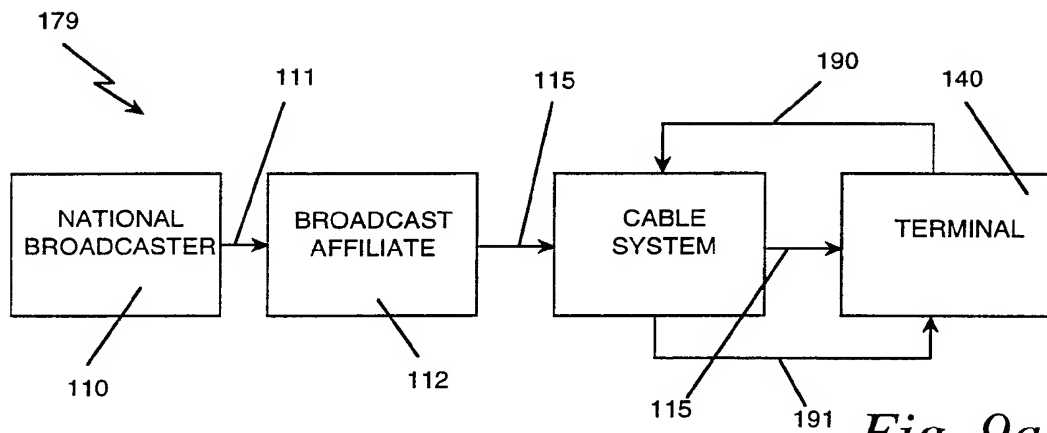
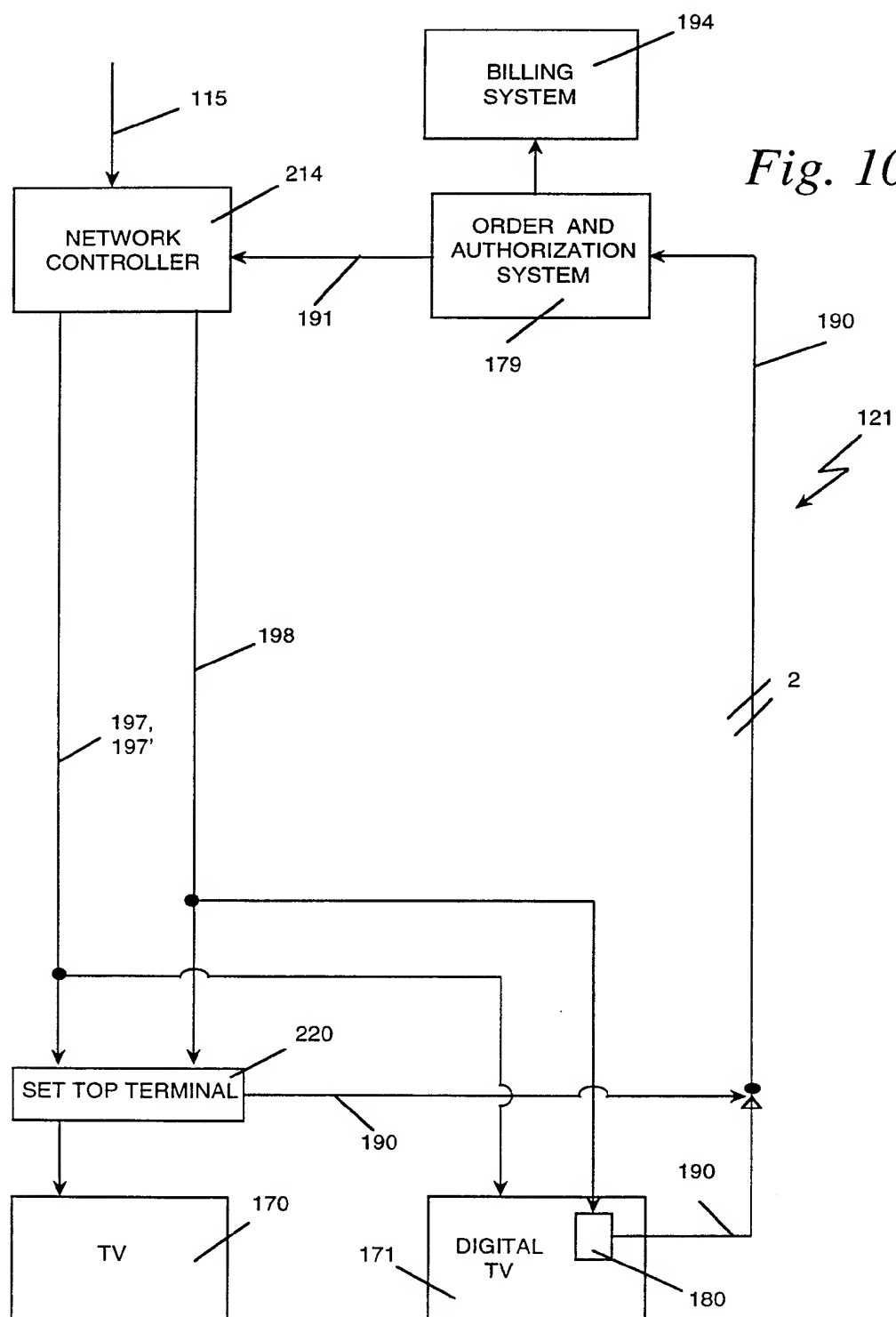
*Fig. 7*

Fig. 8

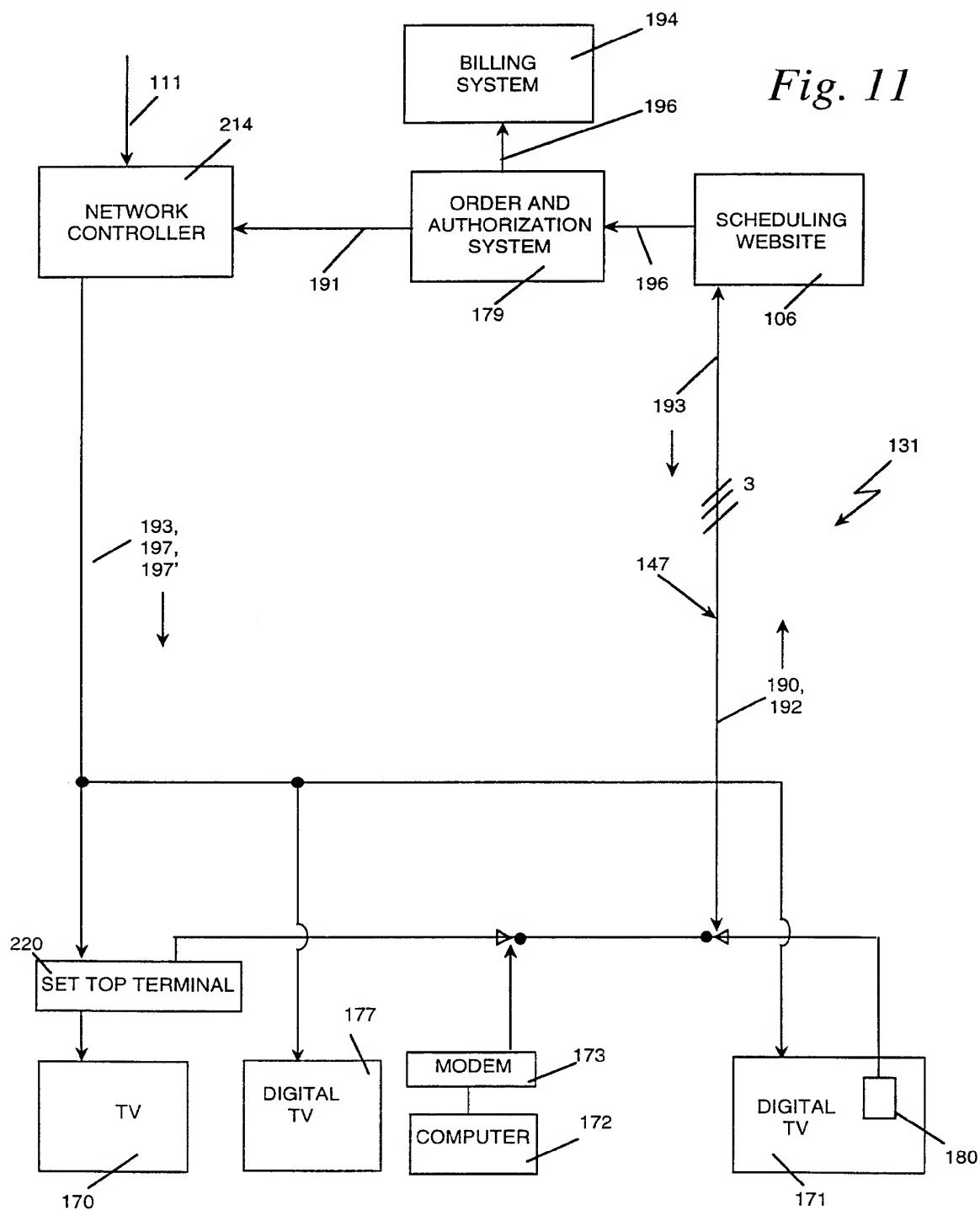
CHANNEL	12 - 1	1 - 2	2 - 3	3 - 4
1 (Free)	HDTV- Simpsons	HDTV - Cheers	HDTV - King of the Hill	HDTV - Seinfeld
2 (PPV - 4.95)	No Program	NFL Football - Colts v. Packers	NFL Football - Colts v. Packers	NFL Football - Colts v. Packers
3 (PPV - 4.95)	No Program	NFL Football - Chiefs v. Raiders	NFL Football - Chiefs v. Raiders	NFL Football - Chiefs v. Raiders
4 (PPV - 1.95)	Terminator IV (R)	Terminator IV (R)	Aliens X (R)	Aliens X (R)
5 (PPV - 1.95)	King Lear (PG-13)	King Lear (PG-13)	King Lear (PG-13)	King Lear (PG-13)
6 (PPV - 1.95)	Gone With the Wind (G)	Gone With the Wind (G)	Gone With the Wind (G)	Gone With the Wind (G)
7 (Free)	Meet the Press	This Old House	Fly Fishing	Tennis
8 (Free)	NFL Today	Meet the Press	This Old House	Golf

13/31



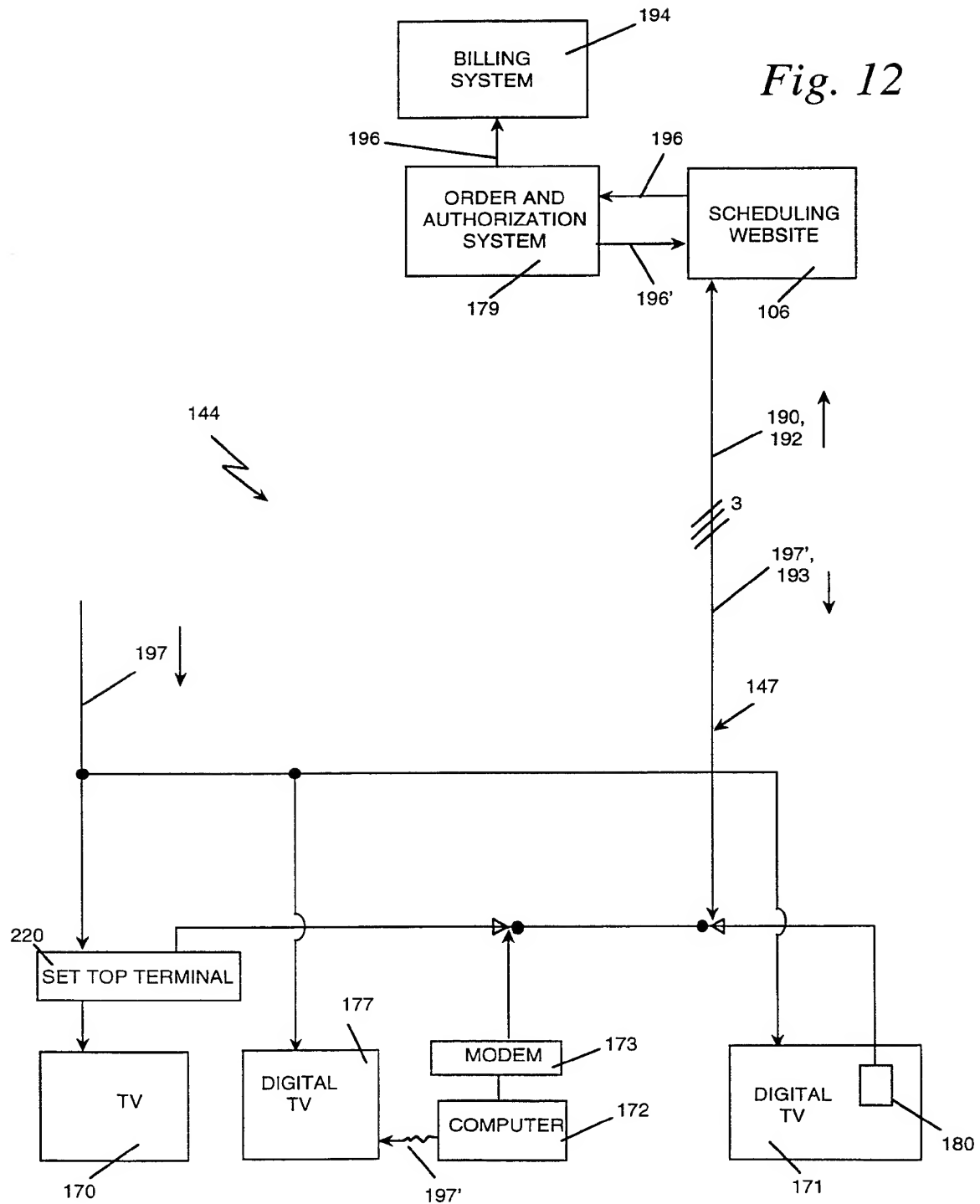


15/31



16/31

Fig. 12



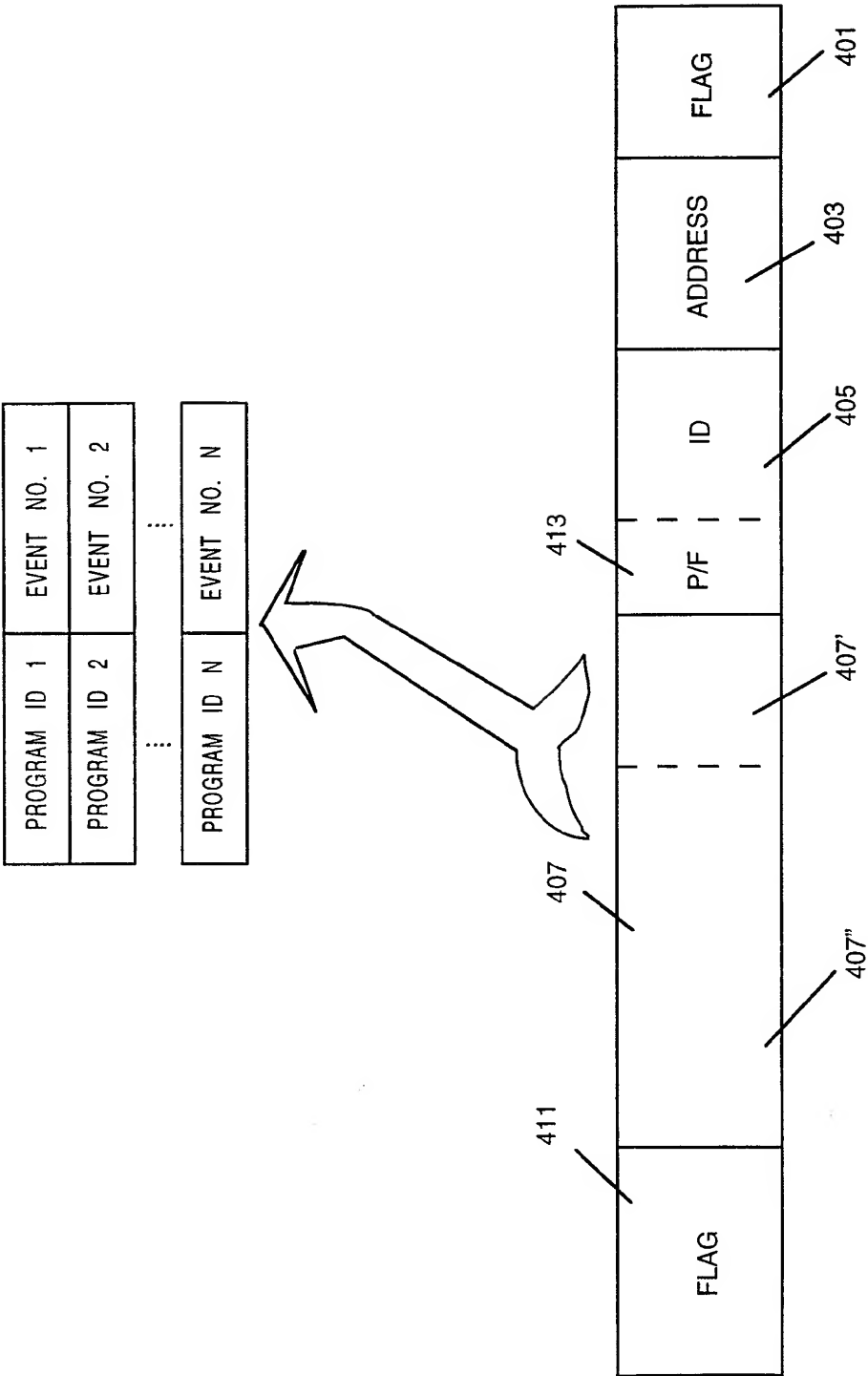


Fig. 13



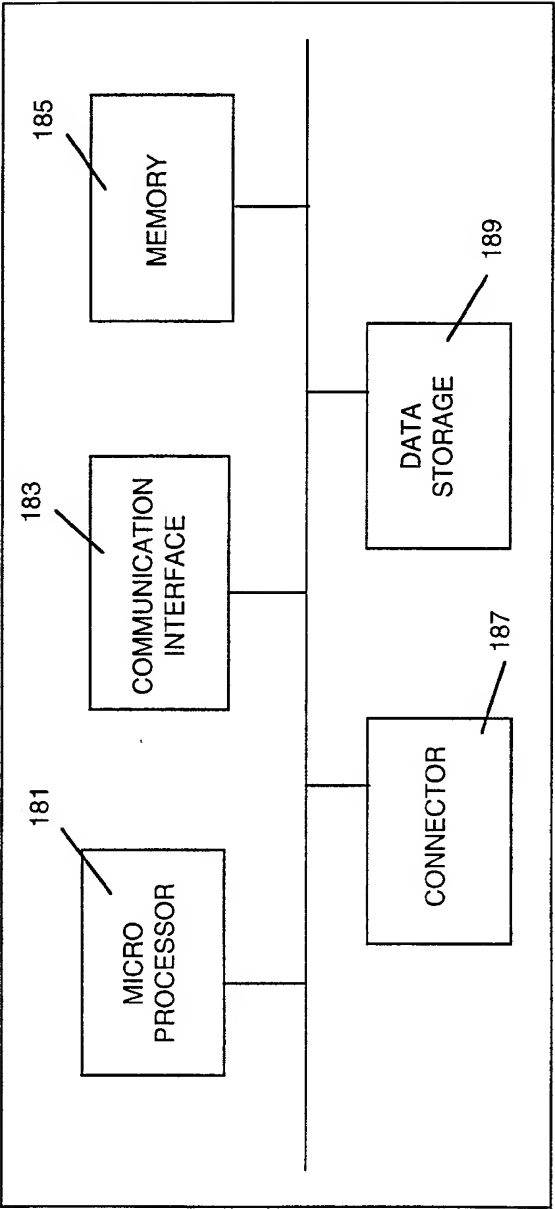
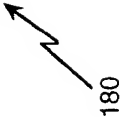
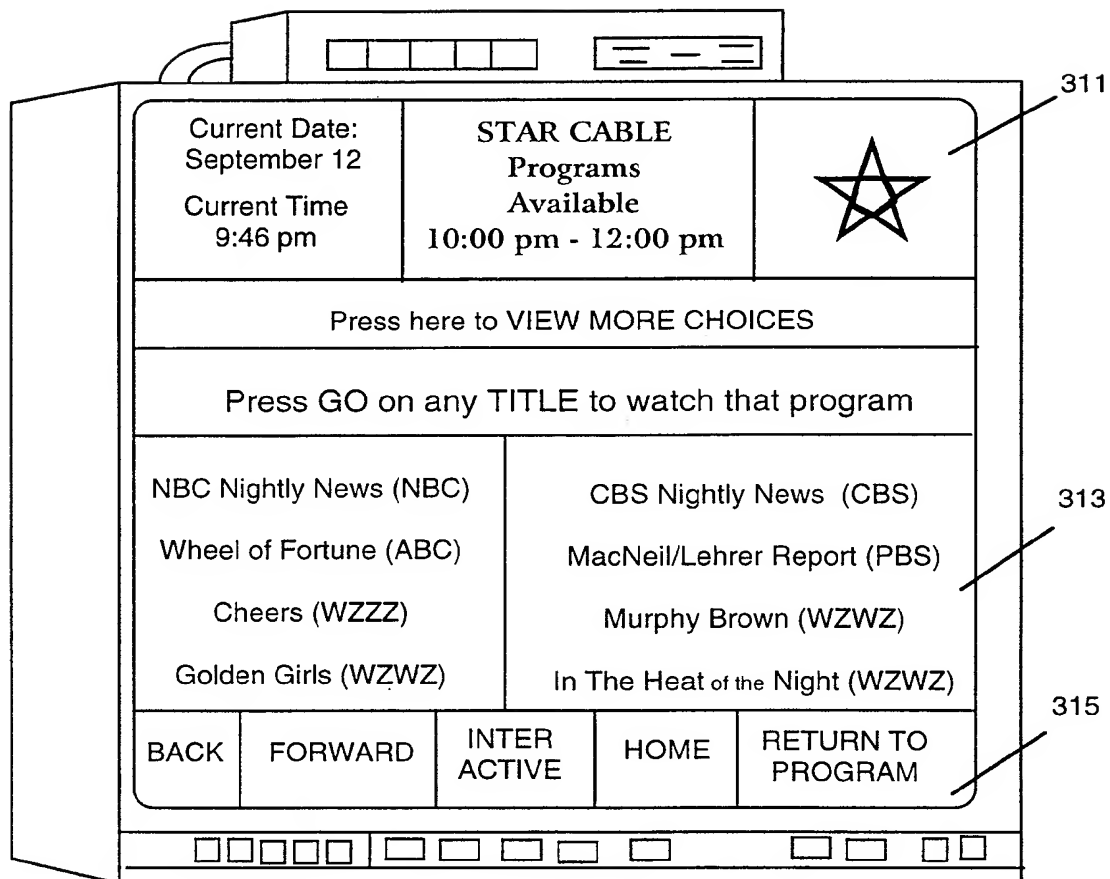


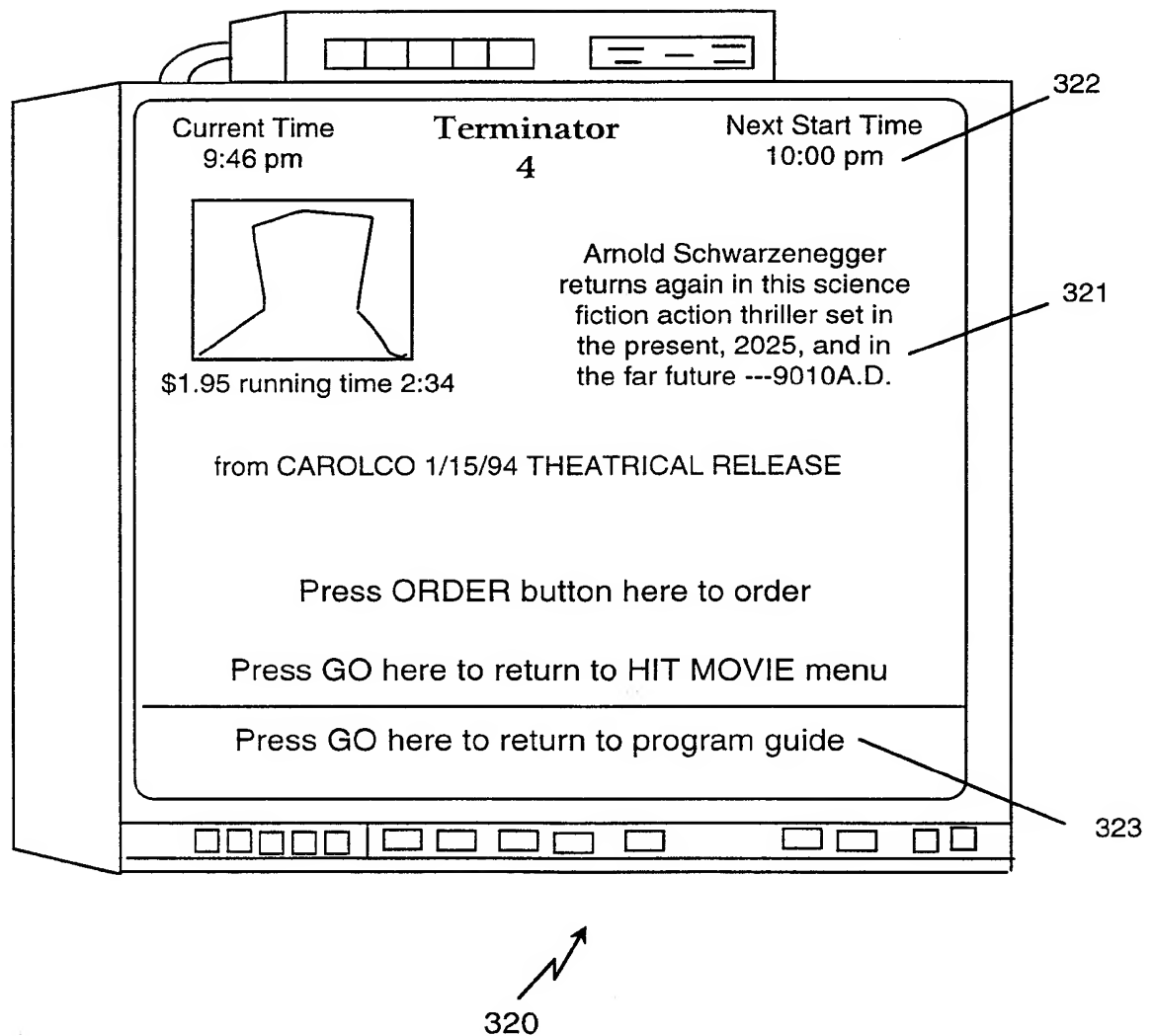
Fig. 14



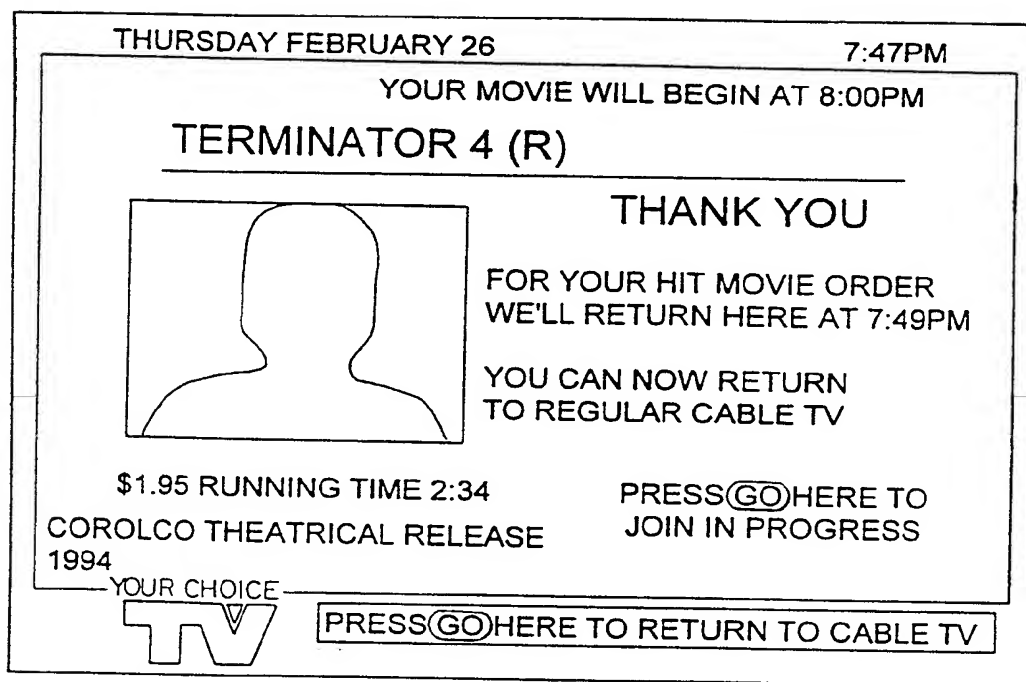
19/31

*Fig. 15a*

20/31

*Fig. 15b*

21/31

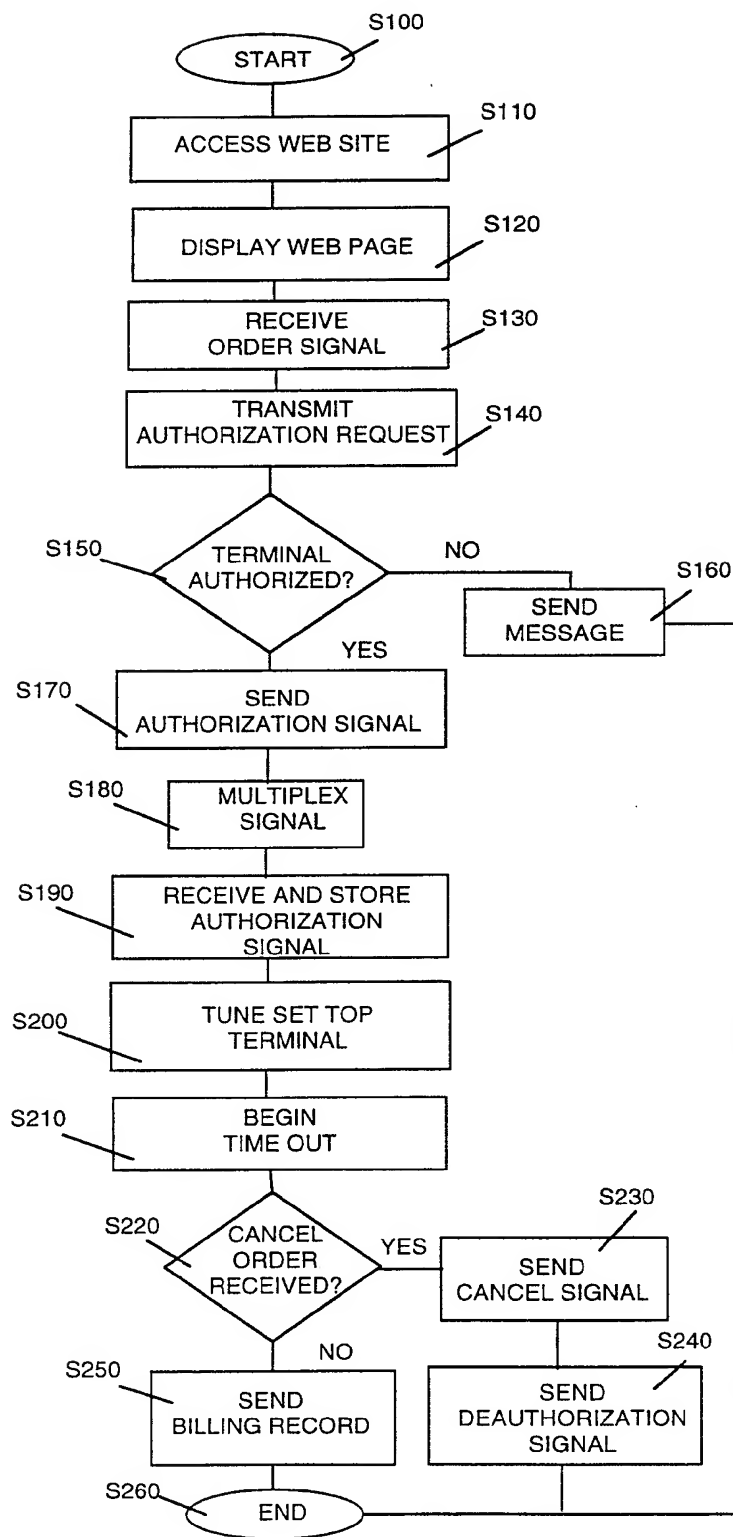
*Fig. 15c*

22/31

*Fig. 15d*

Current Date: September 12		STAR CABLE Programs Available 8:00 pm - 12:00 am			
Current Time 9:46 pm					
Press GO on any TITLE to watch that program					
CH		CH			
100	Home Alone 3 (PG) 8:00 pm/1h50m/\$1.95 8035/10158JA	104	Daybeast (R) 9:00 pm/1h40m/\$1.95 7630/14709TG		
101	Firestorm (R) 10:00 pm/1h10m/\$1.95 9332/56890YG	105	Terminator 4 (R) 10:00 pm/2h30m/\$1.95 5832/10875BV		
102	You and Me (R) 11:00 pm/2h05m/\$1.95 4412/67901PR	106	Detective Smith (PG) 8:00 pm/1h55m/\$1.95 4709/14901NC		
103	Wild Thing (R) 12:00 am/1hr45m/\$1.95 3659/420987NB	107	Four Score (PG) 9:00 pm/2h10m/\$1.95 8055/13631MK		
BACK		FORWARD		INTER ACTIVE	HOME
RETURN TO PROGRAM					

340

*Fig. 16*

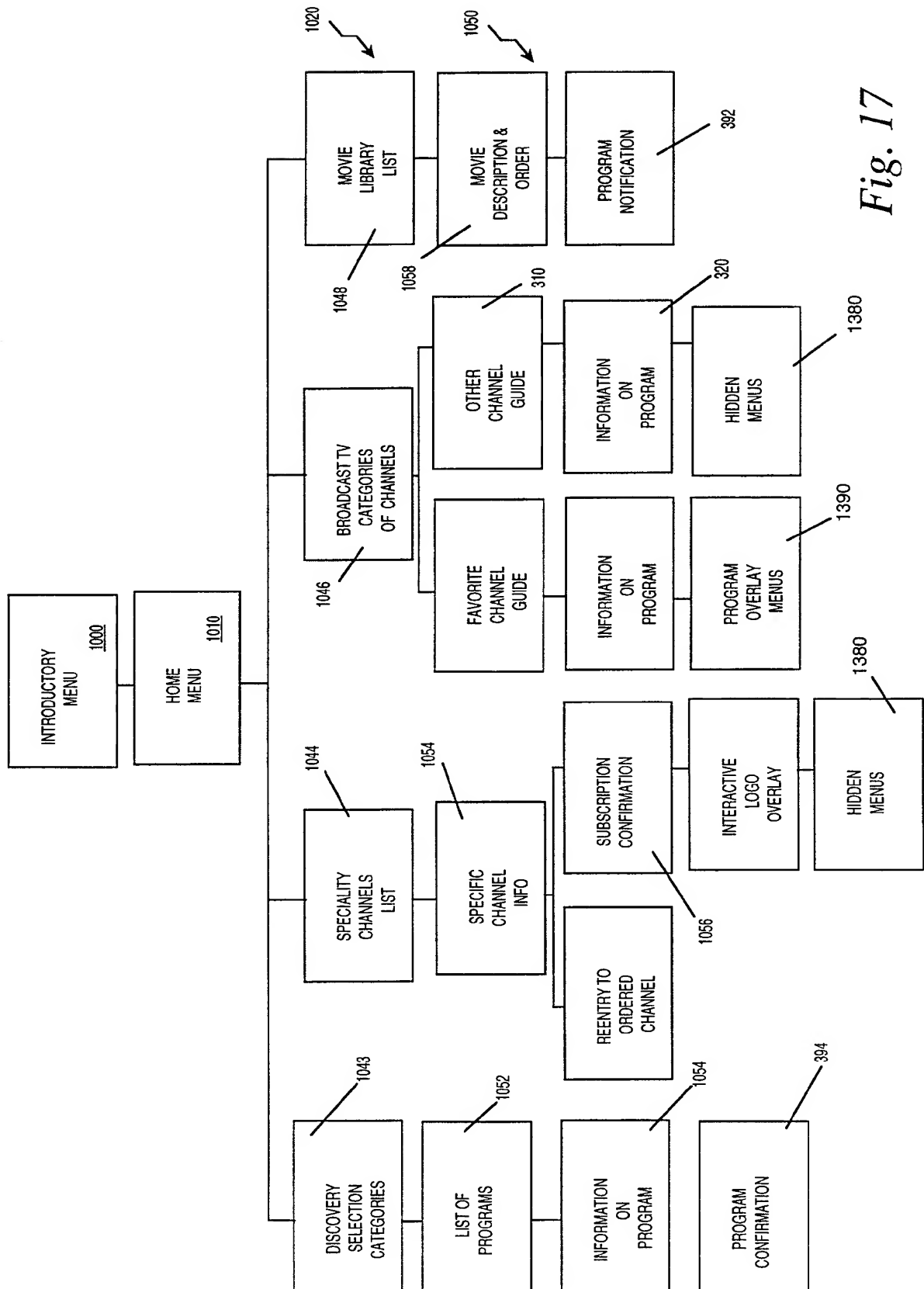


Fig. 17

25/31

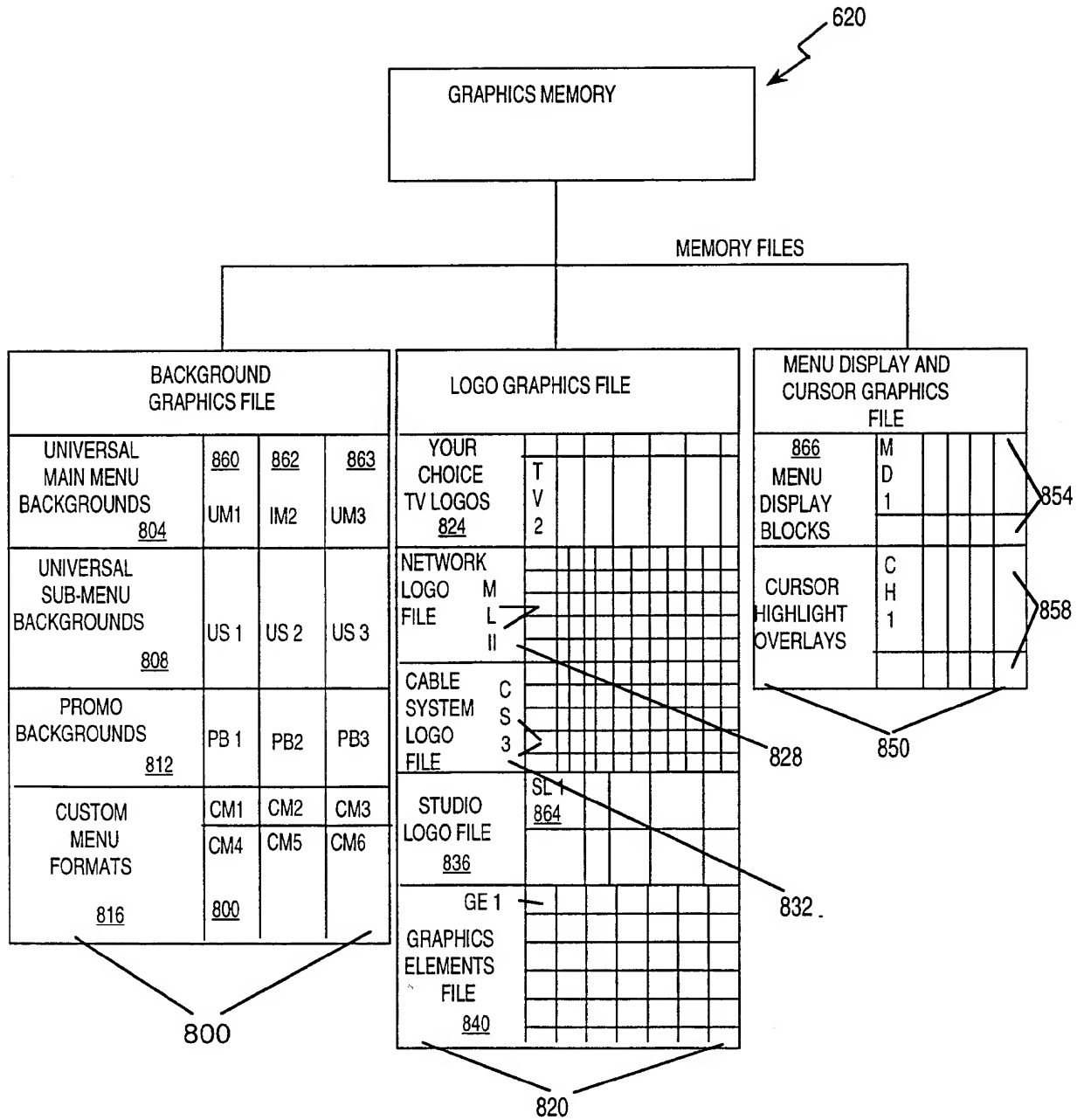
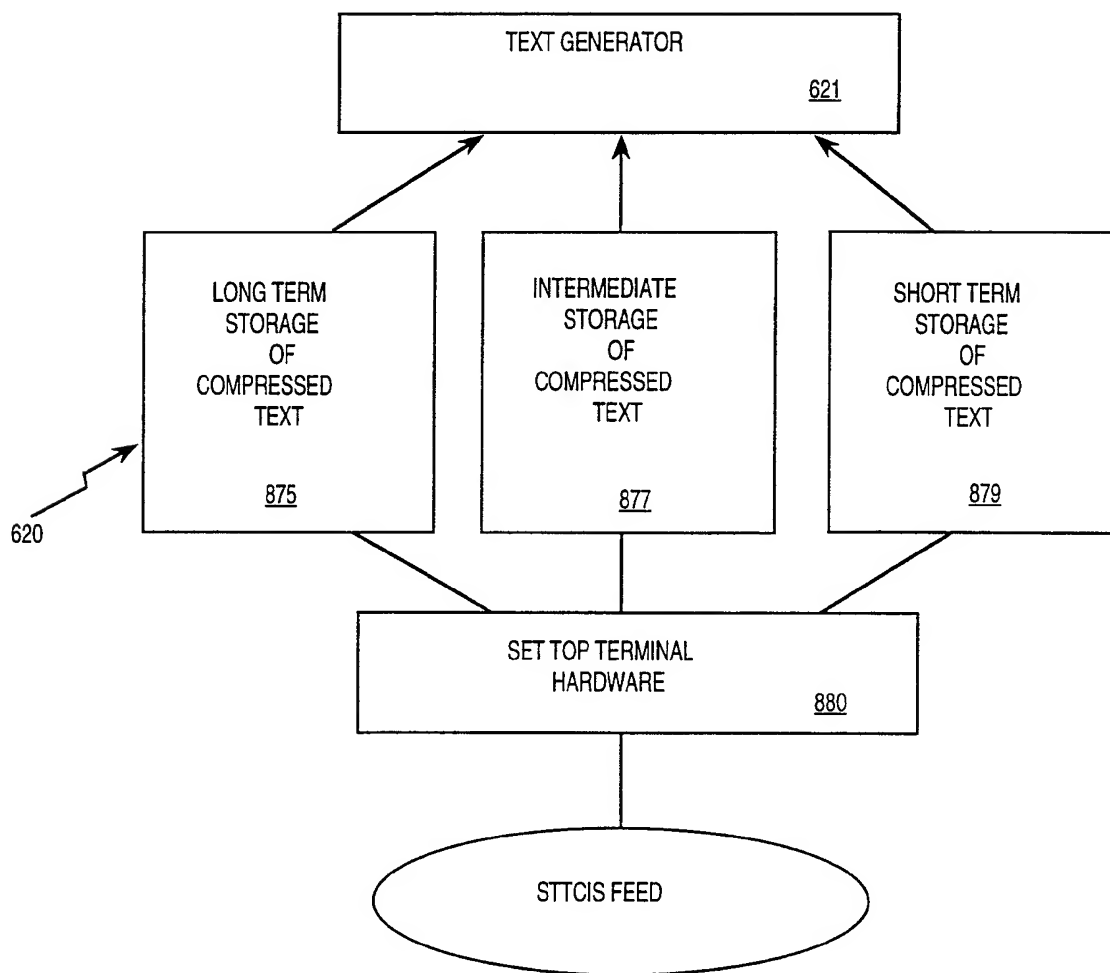


Fig. 18a



26/31

*Fig. 18b*

27/31

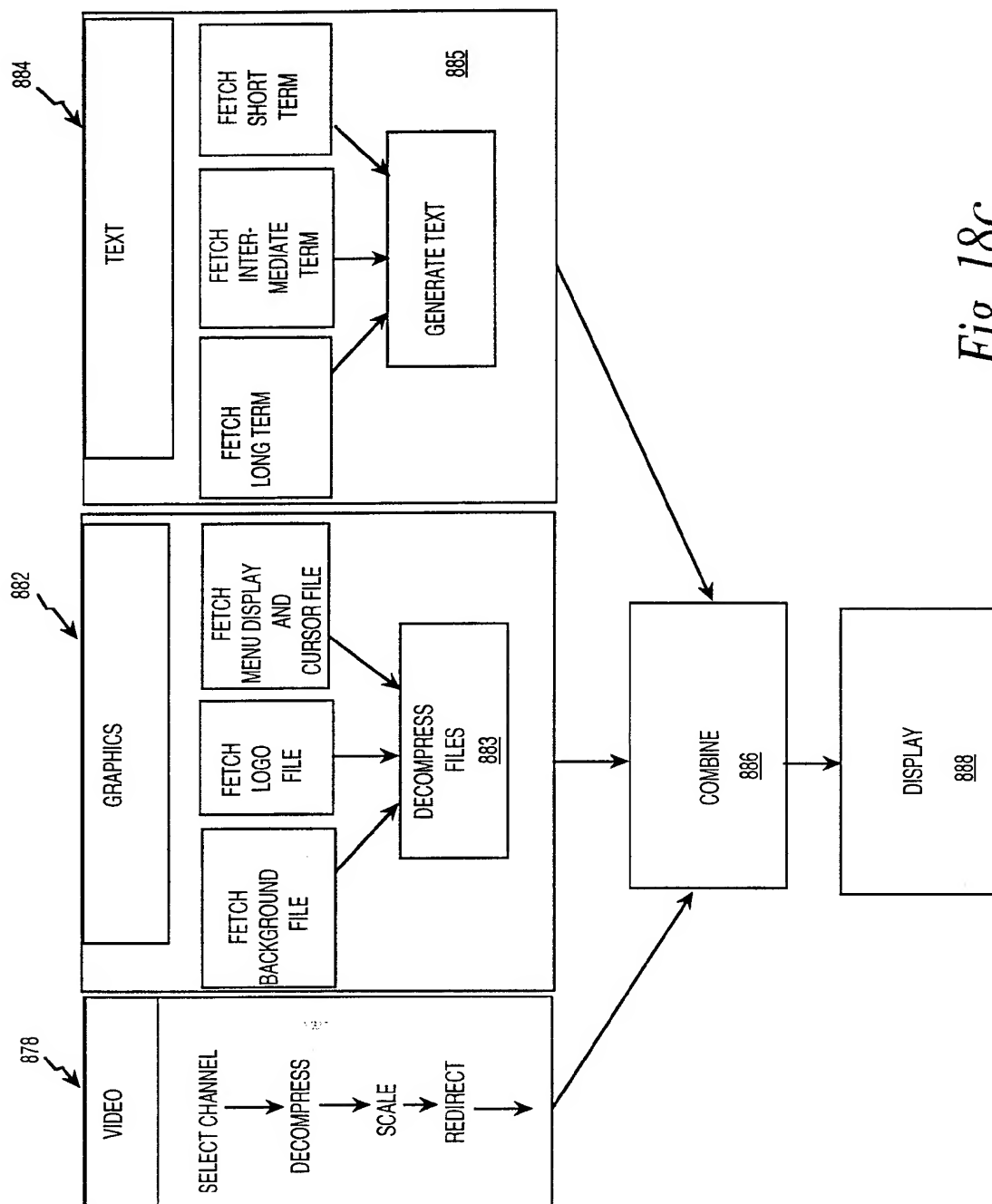


Fig. 18c

28/31

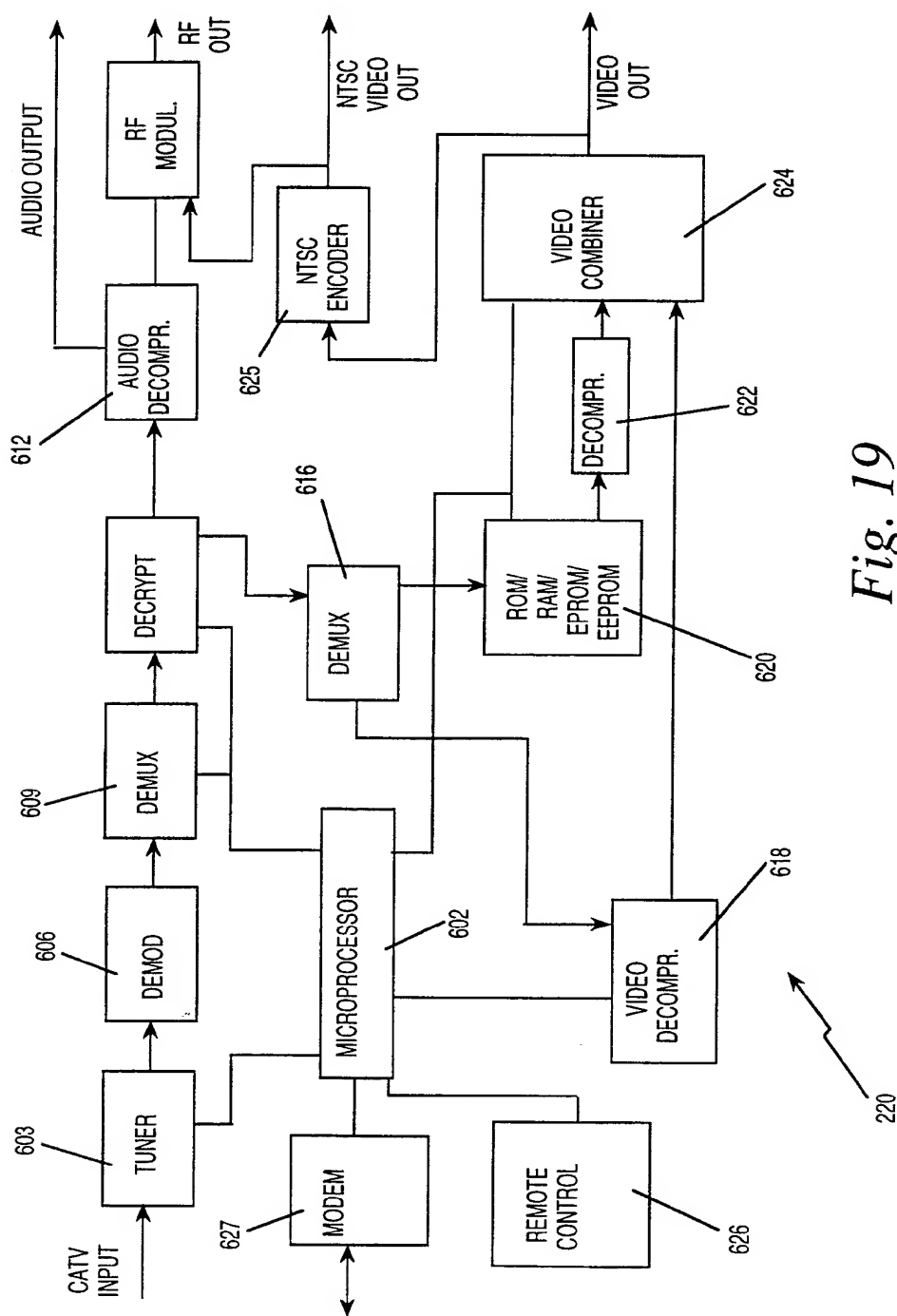
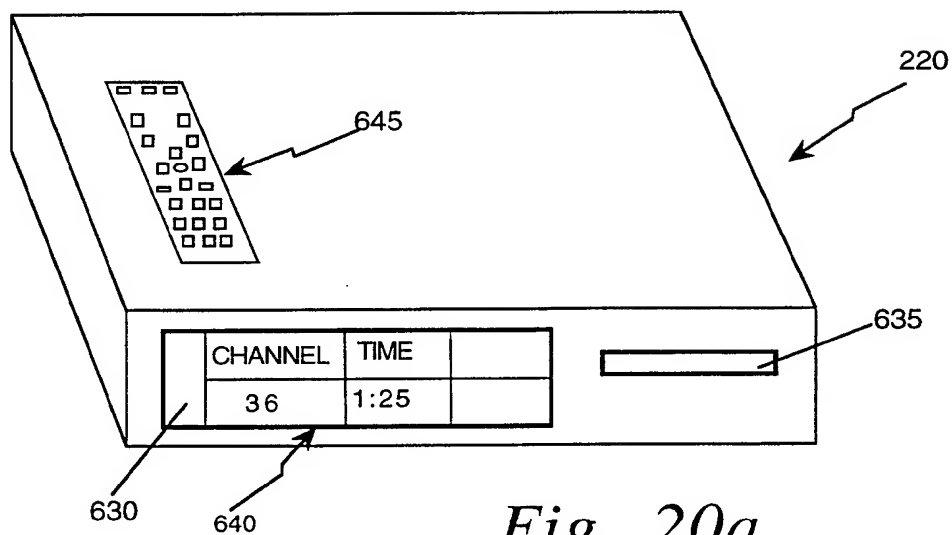
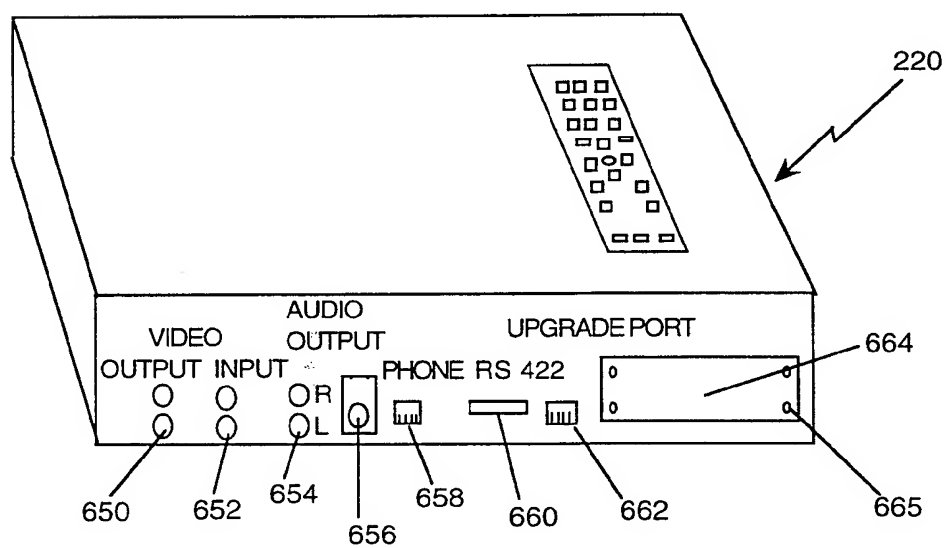


Fig. 19

29/31

*Fig. 20a**Fig. 20b*

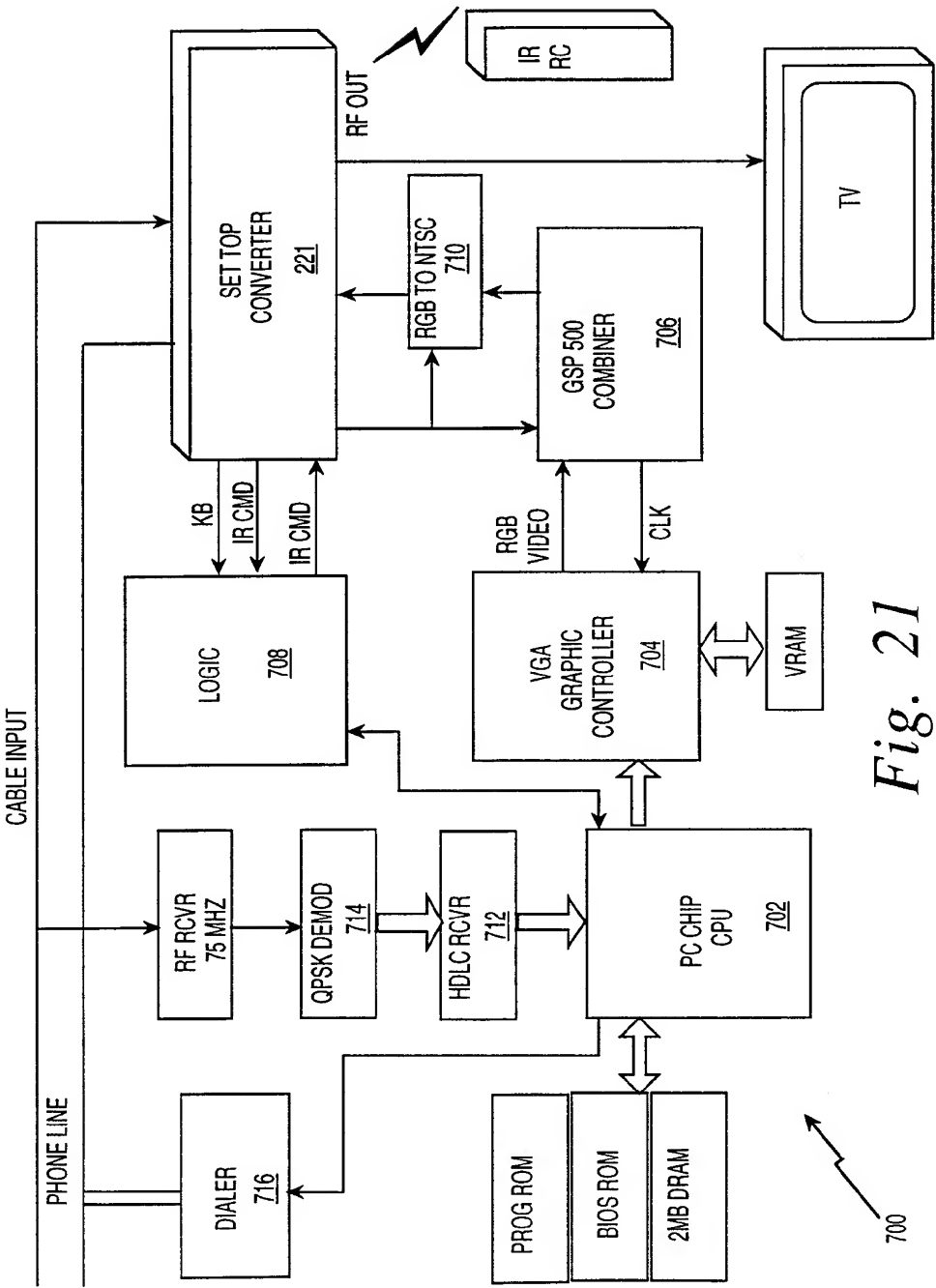


Fig. 21

700

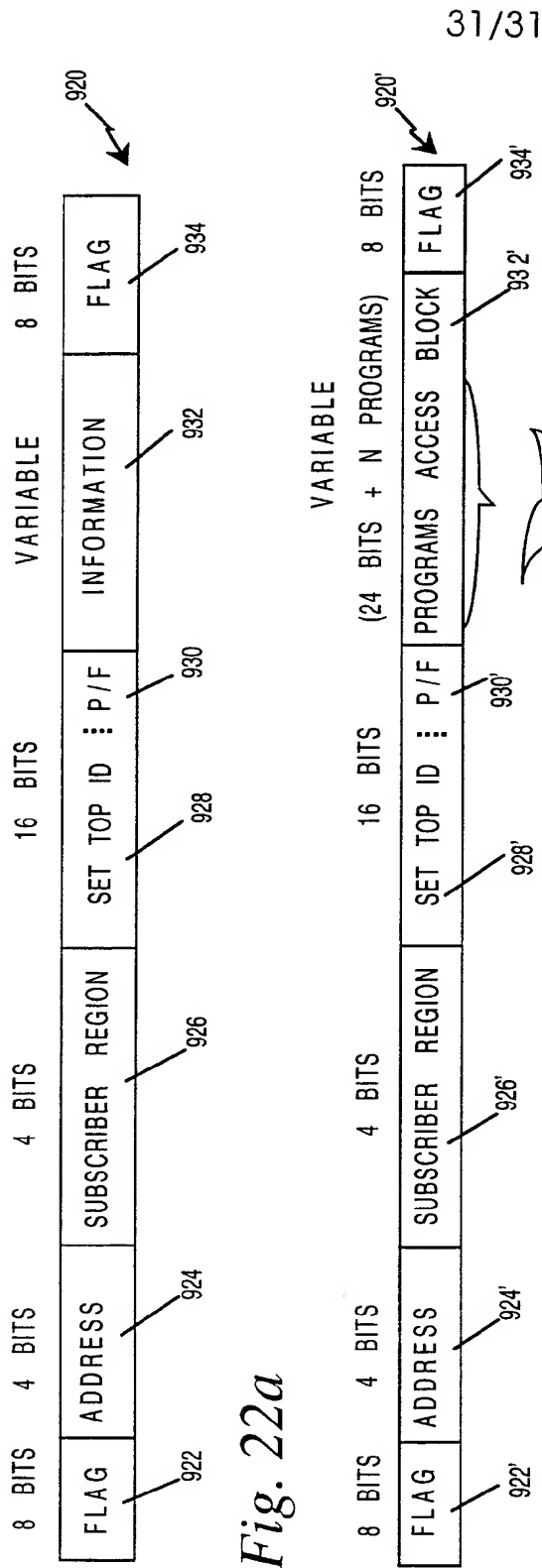


Fig. 22b

8 BITS	16 BITS
PROGRAM NO.	EVENT ID NO.
PROGRAM 1	EVENT ID NO.
PROGRAM 2	EVENT ID NO.
...	...
PROGRAM N	EVENT ID NO.

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 99/26479

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H04N7/16 H04N7/173

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 94 14282 A (DISCOVERY COMMUNICAT INC) 23 June 1994 (1994-06-23) cited in the application	1-141, 151-198
Y	the whole document ---	142-150
Y	WO 96 25006 A (FLEXYDIAL PTY LTD ;GOSNEY PETER JOHN (AU)) 15 August 1996 (1996-08-15)	142-150
A	page 3, line 20 - line 29 page 5, line 6 - line 24 page 19, line 17 -page 20, line 7 --- -/--	33-36, 84,85, 125,126, 144

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### ° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

21 February 2000

Date of mailing of the international search report

25/02/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Van der Zaal, R

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 99/26479

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>WO 97 13368 A (STARSIGHT TELECAST INCORPORATED) 10 April 1997 (1997-04-10)</p> <p>page 8, line 15 -page 9, line 17</p> <p>page 10, line 1 -page 11, line 36</p> <p>page 16, line 21 -page 17, line 39</p> <p>page 19, line 36 -page 29, line 26</p> <p>page 30, line 8 -page 35, line 37</p> <p>-----</p>	1-198



# INTERNATIONAL SEARCH REPORT

Information on patent family members

Int. onal Application No  
PCT/US 99/26479

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9414282 A	23-06-1994	AT 177277 T	15-03-1999
		AT 176840 T	15-03-1999
		AT 183352 T	15-08-1999
		AT 176841 T	15-03-1999
		AU 4440797 A	29-01-1998
		AU 712157 B	28-10-1999
		AU 4532597 A	05-02-1998
		AU 693775 B	09-07-1998
		AU 5732994 A	04-07-1994
		AU 692427 B	11-06-1998
		AU 5733094 A	04-07-1994
		AU 691479 B	21-05-1998
		AU 5733194 A	04-07-1994
		AU 692428 B	11-06-1998
		AU 5733294 A	04-07-1994
		AU 5736394 A	04-07-1994
		AU 5845894 A	22-06-1994
		AU 5869894 A	04-07-1994
		AU 6066798 A	04-06-1998
		AU 6066898 A	04-06-1998
		BR 9307619 A	15-06-1999
		BR 9307620 A	10-08-1999
		BR 9307621 A	15-06-1999
		BR 9307622 A	15-06-1999
		BR 9307624 A	15-06-1999
		BR 9307625 A	31-08-1999
		CA 2151456 A	23-06-1994
		CA 2151457 A	23-06-1994
		CA 2151458 A	23-06-1994
		CA 2151459 A	23-06-1994
		CA 2151460 A	23-06-1994
		CA 2151461 A	09-06-1994
		CA 2151462 A	23-06-1994
		CN 1093211 A	05-10-1994
		CN 1090451 A	03-08-1994
		CN 1090452 A	03-08-1994
		CN 1096151 A	07-12-1994
		CN 1090453 A	03-08-1994
		CN 1090454 A	03-08-1994
		DE 69323560 D	25-03-1999
		DE 69323560 T	23-09-1999
		DE 69323562 D	25-03-1999
		DE 69323562 T	23-09-1999
		DE 69323767 D	08-04-1999
		DE 69323767 T	21-10-1999
		DE 69326020 D	16-09-1999
		EP 0673578 A	27-09-1995
		EP 0673579 A	27-09-1995
		EP 0673580 A	27-09-1995
		EP 0673581 A	27-09-1995
WO 9625006 A	15-08-1996	AU 695508 B	13-08-1998
		AU 4614096 A	27-08-1996
		JP 11500275 T	06-01-1999
		SG 34383 A	06-12-1996
WO 9713368 A	10-04-1997	AU 7387196 A	28-04-1997
		BR 9611064 A	13-07-1999

**INTERNATIONAL SEARCH REPORT**  
information on patent family members

International Application No  
PCT/US 99/26479

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9713368      A		CA      2232003 A	10-04-1997
		CN      1200221 A	25-11-1998
		EP      0880856 A	02-12-1998
		JP      10512420 T	24-11-1998
		US      6002394 A	14-12-1999
<hr/>			